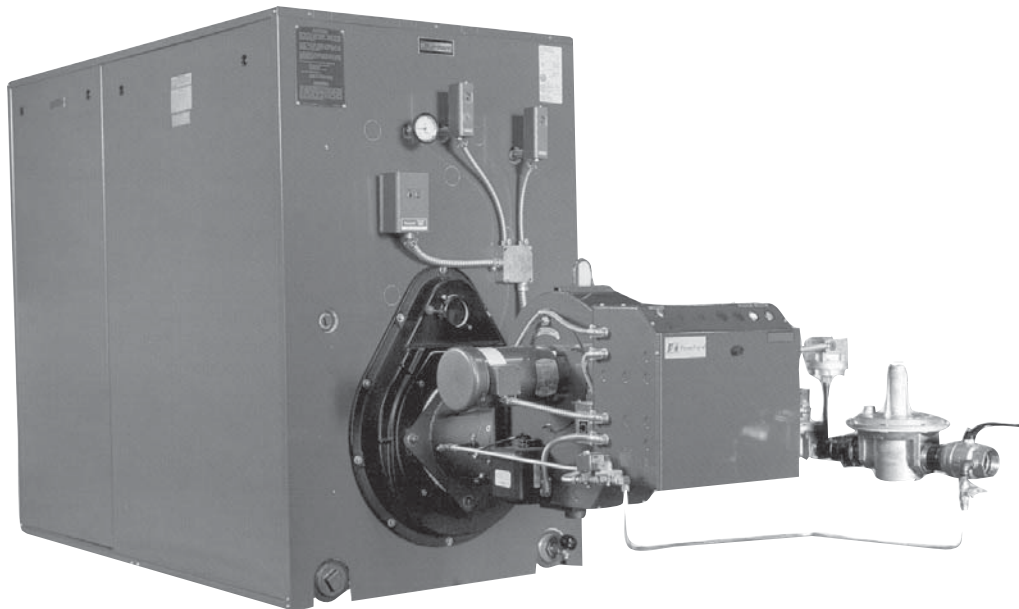


# INSTALLATION, OPERATING AND SERVICE INSTRUCTIONS FOR

# V11 SERIES COMMERCIAL CAST IRON BOILER



For service or repairs to boiler, call your heating contractor. When seeking information on boiler, provide Boiler Model Number and Serial Number as shown on Rating Label.

Boiler Model Number

\_V11\_ \_ \_ \_

Boiler Serial Number

64\_ \_ \_ \_ \_

Installation Date

Heating Contractor

Type Firing

Address

Phone Number

 **Burnham**<sup>®</sup>

AMERICA'S BOILER COMPANY  
Burnham Corporation

Lancaster, PA 17604-3079

[www.burnham.com](http://www.burnham.com)

8142604R7-10/02

Price \$3.00



## IMPORTANT INFORMATION PLEASE READ THIS PAGE CAREFULLY

1. READ THIS MANUAL AND BURNER INSTALLATION MANUAL CAREFULLY BEFORE INSTALLING, OPERATING, OR SERVICING THIS UNIT. THE BURNER MANUAL FOR THIS UNIT IS PROVIDED AND PACKED IN THE BURNER CARTON. IF YOU DO NOT HAVE A BURNER MANUAL, WRITE TO BURNHAM AND ASK FOR APPROPRIATE BURNER MANUAL. KEEP INSTRUCTIONS IN LEGIBLE CONDITION AND POSTED NEAR HEATING UNIT FOR REFERENCE BY OWNER AND SERVICEMAN.
2. ALL BOILERS MUST BE INSTALLED IN ACCORDANCE WITH NATIONAL, STATE AND LOCAL PLUMBING, HEATING AND ELECTRICAL CODES AND THE REGULATIONS OF THE SERVING UTILITIES. AUTHORITIES HAVING JURISDICTION SHOULD BE CONSULTED BEFORE INSTALLATIONS ARE MADE.

IN ALL CASES, REFERENCE SHOULD BE MADE TO THE FOLLOWING STANDARDS:

### USA BOILERS

- A. Current edition of American National Standard ANSI Z223.1/NFPA 54, National Fuel Gas Code or ANSI/NFPA 31, "Installation of Oil Burning Equipment", for clearances between boiler, vent connector and combustible material.
- B. Current Edition of American National Standard ANSI/NFPA 211, "Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances", For Chimney requirements, type of venting material and clearances between vent connector pipe and combustible materials.
- C. Current Edition of American Society of Mechanical Engineers ASME CSD-1, "Controls and Safety devices for Automatically Fired Boilers", for assembly and operations of controls and safety devices.

### CANADA BOILERS

- A. Current Edition of Canadian Standards Association CSA B139, "Installation Code for Oil Burning Equipment", for recommended Installation Practices.
- B. The equipment shall be installed in accordance with the current installation code for gas burning appliances and equipment, CGA B149, and applicable provincial regulations for the class; which should be carefully followed in all cases. Authorities having jurisdiction should be consulted before installations are made.

3. ALL HEATING SYSTEMS SHOULD BE DESIGNED BY COMPETENT CONTRACTORS AND ONLY PERSONS KNOWLEDGEABLE IN THE LAYOUT AND INSTALLATION OF HYDRONIC HEATING SYSTEMS SHOULD ATTEMPT INSTALLATION OF ANY BOILER.
4. THE BOILER MUST BE PROPERLY VENTED IN ACCORDANCE WITH NATIONAL FUEL GAS CODE AND LOCAL CODES. SERIOUS PROPERTY DAMAGE COULD RESULT IF THE BOILER IS NOT PROPERLY VENTED.
5. READ THE LITERATURE ENCLOSED BY THE MANUFACTURER WITH THE VARIOUS ACCESSORY DEVICES. THESE ACCESSORY DEVICES MUST BE INSTALLED AND USED ACCORDING TO THE RECOMMENDATIONS OF THE MANUFACTURER.
6. IT IS THE RESPONSIBILITY OF THE INSTALLING CONTRACTOR TO SEE THAT ALL CONTROLS ARE CORRECTLY INSTALLED AND ARE OPERATING PROPERLY WHEN THE INSTALLATION IS COMPLETED.
7. DO NOT TAMPER WITH THE UNIT OR CONTROLS. RETAIN A COMPETENT SERVICEMAN TO ASSURE THAT THE UNIT IS PROPERLY ADJUSTED AND MAINTAINED.
8. FOR OPTIMUM PERFORMANCE FROM THIS UNIT FOLLOW SERVICE INSTRUCTIONS AS SPECIFIED IN SECTION V OF THIS MANUAL.
9. PROBE AND FLOAT TYPE LOW WATER CUTOFF DEVICES REQUIRE ANNUAL INSPECTION AND MAINTENANCE. REFER TO INSTRUCTIONS ON PAGES 35 AND 36 FOR STEP BY STEP INSPECTION AND CLEANING INSTRUCTIONS.
10. KEEP THE BOILER AREA CLEAN AND FREE OF FIRE HAZARDS. ALL FLAMMABLE DEBRIS, RAGS, PAPER, WOOD, SCRAPS, ETC., SHOULD BE KEPT CLEAR OF THE BOILER AT ALL TIMES.

## **WARNING**

HIGH WATER TEMPERATURES INCREASE THE RISK OF BURNS OR SCALDING INJURY. INSTALL AN AUTOMATIC MIXING VALVE AT THE TANKLESS HEATER OUTLET TO AVOID EXCESSIVELY HOT WATER AT THE FIXTURES AS SHOWN IN FIGURE 32.

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**TABLE I - RATINGS/DATA**

BOILER MODEL	BOILER HORSEPOWER	GROSS OUTPUT MBH	(2) NET I=B=R RATING			BURNER INPUT		HEATING SURFACE (SQ. FT.)		NET FIREBOX VOLUME (CU. FT.)	PRESSURE IN FIREBOX (INCHES WTR. COLUMN)	WATER CONTENT (GALLONS)		BOILER WEIGHT W/WATER (LBS.)		I=B=R VENT DIA (INCHES)
			SQ. FT. STEAM	MBH STEAM	MBH WATER	OIL (GPH)	GAS (MBH)	STEAM	WATER			STEAM	WATER	STEAM	WATER	
V1104	19.9	667	2083	500	580	5.8	837	64.6	74.4	7.9	0.35	59	72	2596	2705	8
V1105	25.6	857	2679	643	745	7.4	1068	83.5	96.2	10.6	0.36	68	84	3076	3210	8
V1106	31.9	1069	3342	802	930	9.2	1328	102.4	118.0	13.2	0.37	77	96	3561	3720	8
V1107	38.3	1281	4013	963	1114	11.0	1588	121.3	139.8	15.9	0.42	87	108	4050	4225	10
V1108	45.3	1517	4829	1159	1319	13.0	1876	140.2	161.6	18.5	0.42	96	120	4533	4733	10
V1109	51.7	1729	5563	1335	1503	14.8	2136	159.1	183.4	21.1	0.39	105	132	5022	5247	10
V1110	58.0	1941	6279	1507	1688	16.6	2396	177.0	204.2	23.8	0.42	115	144	5515	5757	12
V1111	64.3	2154	6967	1672	1873	18.4	2656	195.9	226.0	26.5	0.40	124	156	5997	6263	12
V1112	69.7	2334	7550	1812	2030	20.0	2887	214.8	247.8	29.1	0.42	133	169	6482	6782	12
V1113	74.8	2503	8096	1943	2177	21.5	3103	233.7	296.6	31.8	0.40	143	181	6962	7279	12
V1114	81.6	2730	8833	2120	2374	23.5	3392	252.6	291.4	34.4	0.38	152	193	7450	7792	14
V1115	88.3	2957	9567	2296	2571	25.5	3680	271.5	313.2	37.1	0.36	161	205	7942	8309	14
V1116	93.4	3126	10113	2427	2718	27.0	3897	290.4	335.0	39.7	0.38	171	217	8432	8816	14
V1117	100.2	3353	10846	2603	2916	29.0	4186	309.3	356.8	42.4	0.41	180	229	8916	9325	14
V1118	106.9	3580	11583	2780	3113	31.0	4474	327.2	377.6	45.0	0.39	189	241	9397	9831	16
V1119	111.7	3739	12096	2903	3251	32.5	4691	346.1	399.4	47.7	0.38	199	253	9889	10338	16
V1120	118.2	3957	12800	3072	3441	34.5	4979	365.0	421.2	50.3	0.38	208	265	10371	10845	16
V1121	124.7	4174	13504	3241	3630	36.5	5268	383.9	443.0	53.0	0.40	217	277	10861	11360	16
V1122	129.5	4334	14021	3365	3769	38.0	5485	402.8	464.8	55.6	0.41	227	290	11347	11872	18
V1123	136.0	4551	14721	3533	3957	40.0	5773	421.7	486.6	58.3	0.43	236	302	11831	12381	18

(1) SUFFIX "S" INDICATES STEAM BOILER, "W" INDICATES WATER BOILER. SUFFIX "G" INDICATES GAS-FIRED, "O" INDICATES OIL-FIRED, "GO" INDICATES COMBINATION GAS-OIL FIRED.

(2) I=B=R NET RATINGS SHOWN ARE BASED ON PIPING AND PICKUP ALLOWANCES WHICH VARY FROM 1.333 TO 1.288 FOR STEAM AND 1.15 FOR WATER.

CONSULT MANUFACTURER FOR INSTALLATIONS HAVING UNUSUAL PIPING AND PICKUP REQUIREMENTS, SUCH AS INTERMITTENT SYSTEM OPERATION, EXTENSIVE PIPING SYSTEMS, ETC.

THE I=B=R BURNER CAPACITY IN GPH IS BASED ON OIL HAVING A HEAT VALUE OF 140,000 BTU PER GALLON.

(3) BOILER RATINGS ARE BASED ON 13.0 % CO<sup>2</sup>, + .10" WATER COLUMN PRESSURE AT BOILER FLUE OUTLET.

RATINGS SHOWN ABOVE APPLY AT ALTITUDES UP TO 1000 FEET ON OIL AND 2000 FEET ON GAS. FOR ALTITUDES ABOVE THOSE INDICATED, THE RATINGS SHOULD BE REDUCED AT THE RATE OF 4 % FOR EACH 1000 FEET ABOVE SEA LEVEL.

MAXIMUM ALLOWABLE WORKING PRESSURE:  
 (USA BOILER) (CANADIAN BOILER)  
 STEAM - 15 PSI STEAM - 15 PSI  
 WATER - 50 PSI WATER - 50 PSI  
 OPTIONAL WATER - 80 PSI  
 (SPECIAL ORDER)

# SECTION I - GENERAL INFORMATION (CONTINUED)

## A. INSPECT SHIPMENT carefully for any signs of damage.

1. ALL EQUIPMENT is carefully manufactured, inspected and packed. Our responsibility ceases upon delivery of crated Boiler to the carrier in good condition.
2. ANY CLAIMS for damage or shortage in shipment must be filed immediately against the carrier by the consignee. No claims for variances from, or shortage in orders, will be allowed by the manufacturer unless presented within sixty (60) days after the receipt of goods.

## B. LOCATE THE UNIT

1. RECOMMENDED SERVICE CLEARANCE -  
 Locate the unit in the boiler room so as to provide ease of venting and adequate clearance for maintenance, serviceability, and installation of piping. Refer to Figure 1 for boiler dimensional data.  
**FRONT** --- Provide 54" service clearance for removal, maintenance, and servicing of burner and controls.  
**REAR** --- Provide a minimum service clearance from the boiler jacket for access to pressure relief door, flame observation port, rear flue damper and vent piping, relief valve, and boiler return piping. See following chart.

RECOMMENDED REAR SERVICE CLEARANCE			
Flue Outlet Size	Top Flue Outlet	Rear Flue Outlet	
		Combustible Surfaces	Non-Combustible Surfaces
8" Dia.	18"	42"	27"
10" Dia.		45"	30"
12" Dia.		48"	33"
14" Dia.		49"	34"
16" Dia.		52"	37"
18" Dia.		54"	39"

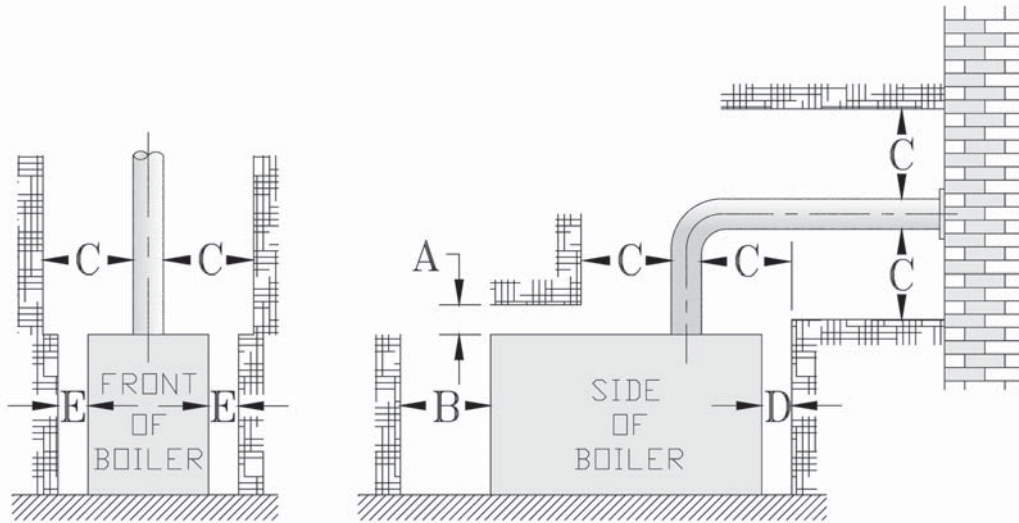
**LEFT SIDE** --- Provide a minimum clearance from the boiler jacket of 36" for cleaning of flueways.

**RIGHT SIDE** --- Less Tankless Heater - Provide a minimum clearance from boiler jacket of 12".

With Tankless Heater - Provide a minimum clearance from the boiler jacket of 35" for installation and removal of tankless heater(s).

**TOP** --- Provide a minimum clearance from the boiler jacket of 24".

2. FOR MINIMUM CLEARANCES to combustible materials, See Table II.



**Table II: Minimum Installation Clearances To Combustible Materials (Inches)**

Boiler	A	B	C	D	E
	Above	Front	Chimney Connector	Rear	Sides
V11	6	24	18	6	6

**NOTE 1:** Listed clearances comply with American National Standard ANSI/NFPA 31, Installation of Oil Burning Equipment.

**NOTE 2:** V11 Series boilers can be installed in rooms with clearances from combustible material as listed above. Listed clearances cannot be reduced for alcove or closet installations.

**NOTE 3:** For reduced clearances to combustible material, protection must be provided as described in the above ANSI/NFPA 31 standard.

3. PROVIDE ADEQUATE FOUNDATION for the unit. Refer to Figure 2.

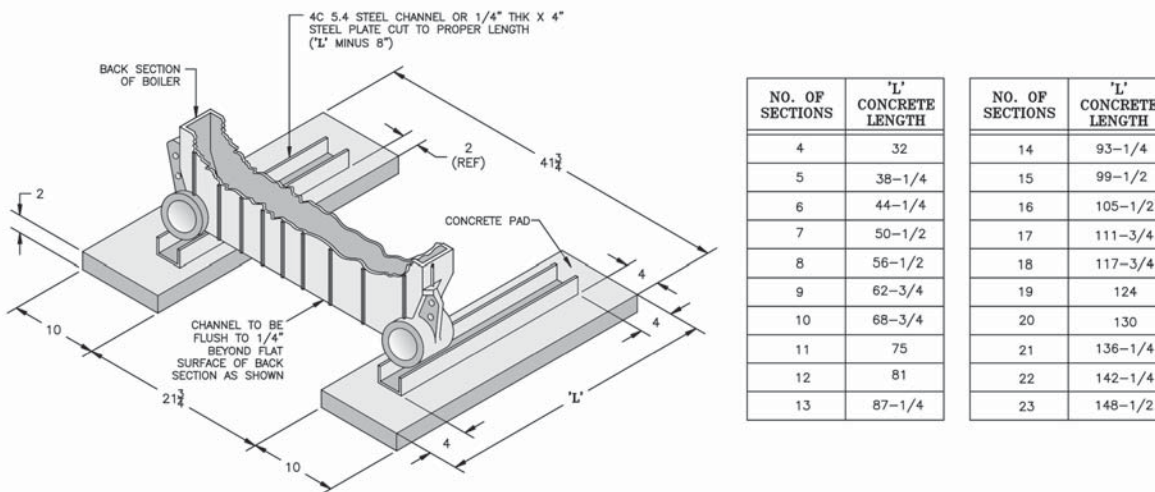


Figure 2: Boiler Foundation

**CAUTION**

- a. DO NOT INSTALL BOILER ON CARPETING. Boiler is suitable for installation on combustible floors.
- b. Floor construction should have adequate load bearing characteristics to bear the weight of the boiler filled with water (see Table 1). A boiler foundation similar to the one shown in Figure 2 is recommended if the boiler room floor is weak or uneven or if a water condition exists.

4. PROVIDE AIR SUPPLY AND VENTILATION to accommodate proper combustion.

For commercial and industrial equipment, permanent facilities for supplying an ample amount of outside air shall be provided in accordance with the following.

For boiler rooms adjacent to outside walls, and where combustion air is provided by natural ventilation from the outside, there shall be a permanent air supply inlet having a total free area of not less than 1 sq. in. per 4,000 Btu per hr. (35 sq. in. per gal. per hr.) (5.5 cm<sup>2</sup> per kw.) of total input rating of the burner or burners and in no case less than 35 sq. in. (0.425 m<sup>2</sup>).

For boiler rooms not adjacent to outside walls, the combustion air shall be supplied in a manner acceptable to the authority having jurisdiction.

- a. In the absence of local requirements, the confined space shall be provided with two permanent openings, one in or near the top of the room and one near the bottom. The openings shall communicate by means of ducts, with the outdoors or to such spaces (crawl or attic) that communicate with the outdoors.

- i. Where communicating by means of vertical ducts, each opening shall have a free area of not less than 1 sq. in. per 4,000 Btuh (35 sq. in. per gph.) (5.5 cm<sup>2</sup> per kw) of total input rating of all appliances in the enclosure.
- ii. If horizontal ducts are used, each opening shall have a free area of not less than 1 sq. in. per 2,000 Btuh (70 sq. in. per gph.) (11 cm<sup>2</sup> per kw) of total input of all appliances in the enclosure.

5. CHIMNEY OR VENT

The V11 is designed for forced draft firing and may be used with a conventional natural draft stack (fifteen feet minimum height) or a stub vent (see Figure 3). See Table I for the proper vent size. Draft controls are not normally required, although they may be used on installations where a natural draft stack is used or on multiple boiler installations with a common stack. The boiler is provided with a breeching damper which should be adjusted to maintain a positive pressure of 0.1" W.C. in the vent connector box during burner operation.

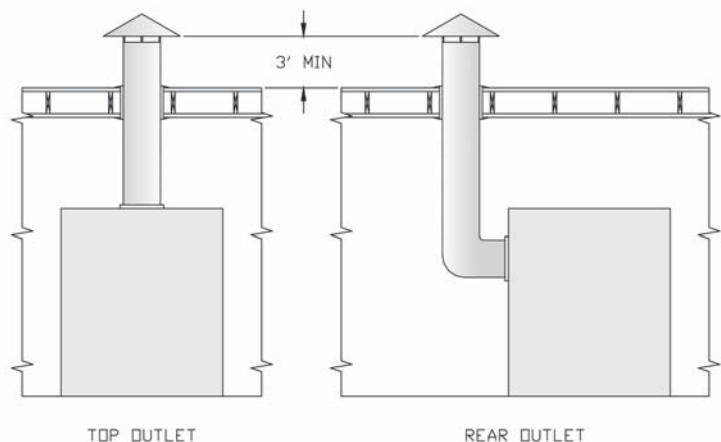


Figure 3: Typical Arrangement For Stub Vent



## SECTION II - CAST IRON BLOCK ASSEMBLY

**A. FACTORY ASSEMBLED SECTIONS** - The assemblage should be set in the proper location as outlined in Section I. Lifting arrangement and weights are given in Figure 4.

The tie-rod nuts should then be loosened until finger tight. Now proceed to Step C of this section on page 15, "HYDRO-STATIC TEST".

**B. FIELD ASSEMBLED SECTIONS** - If the boiler was ordered to be field assembled, follow the assembly procedure outlined on the following pages.

**1. ASSEMBLY OF SECTIONS (MANUAL DRAW-UP)**

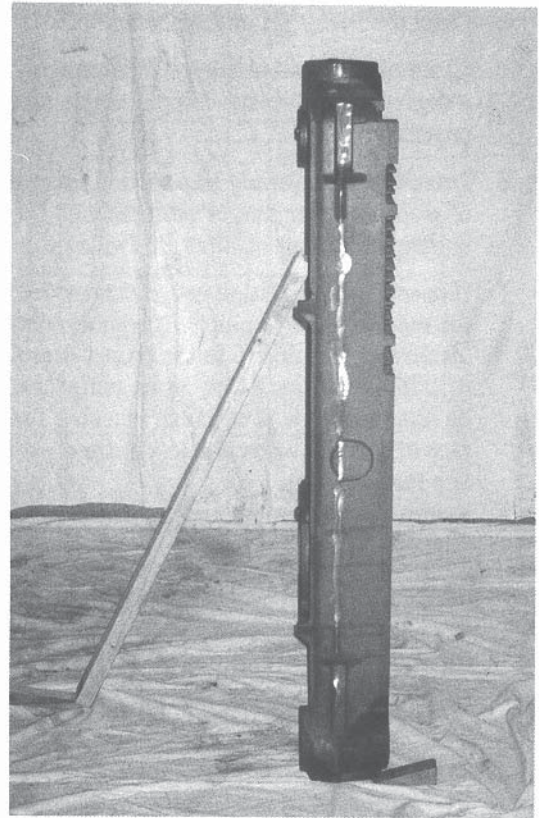
These sections are designed to be drawn together one section at a time using the 11" long draw-up rods (provided) and ordinary hand tools.

Tools required:

- (1) 3/4" Drive Ratchet
- (1) 1 1/4" Socket
- (1) 1 1/4" Combination or Open End Wrench
- (1) Can Thread Cutting Oil or Grease

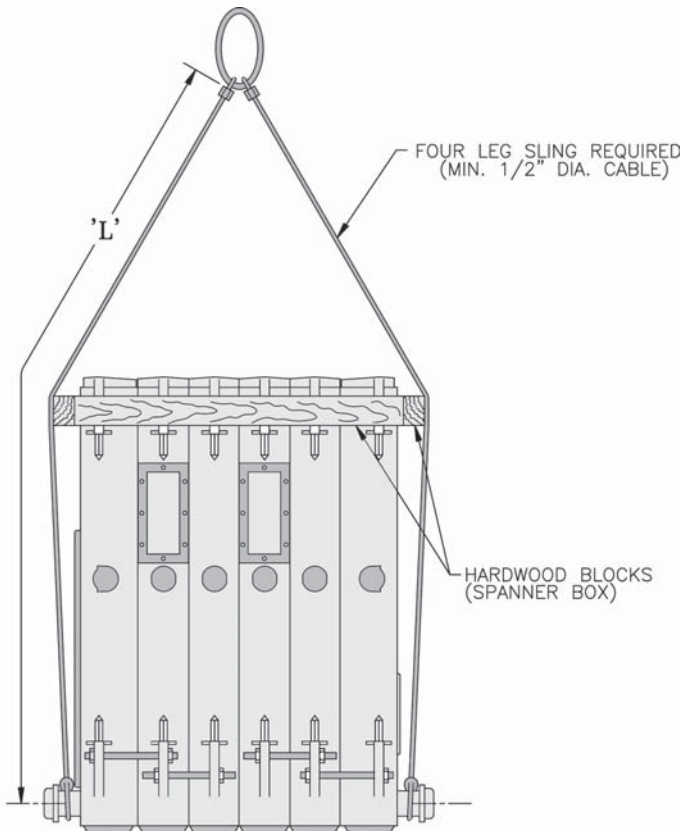
**WHEN ASSEMBLING SECTIONS WITHOUT HYDRAULIC DRAW-UP EQUIPMENT, NEVER ASSEMBLE MORE THAN ONE SECTION AT A TIME.**

- a. Place the rear section in its approximate final position, as outlined in Section I and support it with a suitable prop. See Figure 5.



**Figure 5: Positioning of Back Section**

NUMBER OF SECTIONS	LIFTING WEIGHT (LBS)	MIN. SLING LENGTH 'L'
4	1833	7'
5	2226	8'
6	2618	8'
7	3010	9'
8	3403	9'
9	3795	10'
10	4188	10'
11	4580	11'
12	4972	11'
13	5365	12'
14	5757	12'
15	6150	13'
16	6542	13'
17	6934	14'
18	7327	14'
19	7719	15'
20	8112	15'
21	8504	16'
22	8896	16'
23	9289	17'



**Figure 4: Lifting Instruction**

- b. On sizes 1104 thru 1106 only - Open target wall carton, apply silastic to back of target wall and secure target wall to rear section.
- c. Open the Boiler Assembly Carton(s).
- d. Clean nipples and nipple ports thoroughly with a de-greasing solvent. Use the Locktite #592 supplied to lubricate the nipples and nipple ports. Apply the lubricant to the nipples and nipple ports, then use a brush to disperse it evenly around the nipples and the nipple ports. Use approximately 25 ml of Locktite #592 per flueway [(1) 7" and (2) 3" nipples and their (6) corresponding nipple ports].
- e. Drive nipples squarely into section using block of wood and hammer, or preferably an aluminum headed hammer, if available.
- f. A special nipple setting gauge is provided for the nipples. Gauge nipple in both directions to insure that it is driven to the proper depth into the nipple opening. Cut-out in gauge must rest on nipple, with legs of gauge touching finished face of section, when nipple is properly driven. See Figure 6.

## IMPORTANT

NIPPLES MUST BE DRIVEN AS DIRECTED TO INSURE TIGHT JOINTS. MOST NIPPLE LEAKS ARE CAUSED BY TILTED OR COCKED NIPPLES.

- g. THIS IS A FORCED DRAFT FIRED BOILER & SEALANT MUST BE APPLIED WHERE SPECIFIED FOR PROPER AND SAFE PERFORMANCE. THE BURNHAM CORPORATION HAS APPROVED A SECTION JOINT SEALANT (SILASTIC) MANUFACTURED BY DOW-CORNING UNDER THE PRODUCT NUMBERS OF 732-RTV, 732-BL11 AND 781. ALL THREE (3) NUMBERS ARE THE SAME MATERIAL.

The grooves in the ground joint along the edge of the section should be cleaned with a wire brush. Then using a cartridge of sealant in a caulking gun, apply at least a 1/4" bead of Silastic to one side of each joint to be mated. Touch up any missed spots before draw-up. Touch-up after draw-up has no value. See Figure 7.

## IMPORTANT

SECTIONS MUST BE DRAWN UP TIGHT WITHIN FOUR (4) HOURS OF THE TIME WHEN SILASTIC IS FIRST APPLIED. SILASTIC CURES IN FOUR (4) HOURS AND WILL NOT FLOW INTO SEAL GROOVES AFTER FOUR HOURS FROM APPLICATION, REGARDLESS OF THE PRESSURE APPLIED.

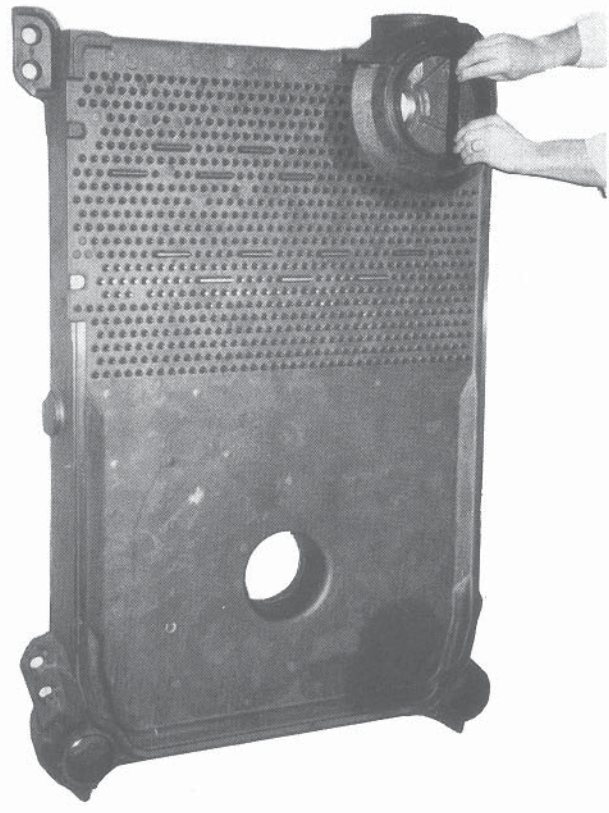


Figure 6: Setting of Nipples

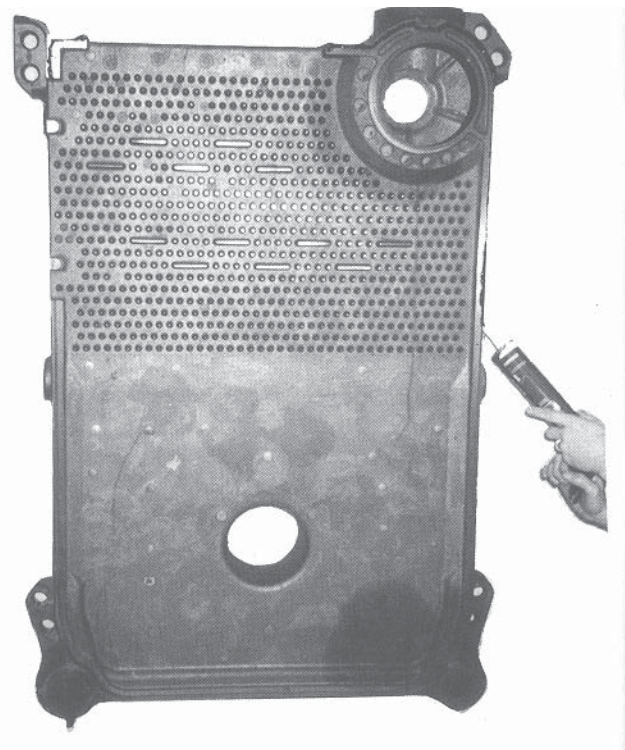


Figure 7: Application of Sealant





- h. From "Section Arrangement" chart (see Figure 8 on Page 11) select next section according to "Identification Code" at top of chart.

## IMPORTANT

THE SECTIONS MUST BE ASSEMBLED ACCORDING TO THE ARRANGEMENT SHOWN TO ENSURE PROPER OPERATION, PROPER ASSEMBLY OF CANOPY, JACKET AND ALIGNMENT OF PIPING AND TANKLESS HEATERS WITH JACKET KNOCKOUTS. REMEMBER ORDER OF ASSEMBLY STARTS WITH THE BACK SECTION AND WORKS TOWARD THE FRONT.

- i. Clean and lubricate nipple ports on next section to be assembled and place on nipples previously installed in rear section. To facilitate assembly, it is advisable to enter the upper nipple first in its port. Then enter the lower nipples in their respective ports. If necessary, place a lifting bar (crowbar) under the center of the section and lift the nipple port onto the upper nipple.
- j. Drive section in place with a heavy block of wood, striking blows as squarely as possible over nipple ports.
- k. Large draw-up rod lugs with dual holes are cast in the four corners of each casting. Starting with the upper holes, install four 3/4" x 11" long draw-up rods along with washers and nuts (see Figure 9).

## NOTICE

AVOID DAMAGE TO THE DRAW ROD THREADS WHILE DRAWING UP SECTIONS. APPLY THREAD CUTTING OIL OR GREASE FREELY TO TIE ROD THREADS WHILE ASSEMBLING SECTIONS TO PREVENT STRIPPING OF THREADS ON ROD AND TO MAKE ASSEMBLING EASIER.

- l. DRAW UP SECTION SLOWLY AND EVENLY, tightening each draw-up rod a little at a time so that sections are equally spaced, starting with lower draw-up rods. KEEP NIPPLES ALIGNED WITH NIPPLE PORTS. If necessary, tap nipples lightly with a blunt tool or rod to keep nipples from cocking while sections are being drawn up. DO NOT DRAW UP SECTION WHEN NIPPLES ARE COCKED. Continue tightening draw-up rods equally, periodically bumping the section with the heavy block of wood to relieve tension on the draw-up rods, until sections meet iron-to-iron on the ground surfaces.
- m. CONTINUE ASSEMBLING SECTIONS IN THEIR RESPECTIVE ORDER alternating

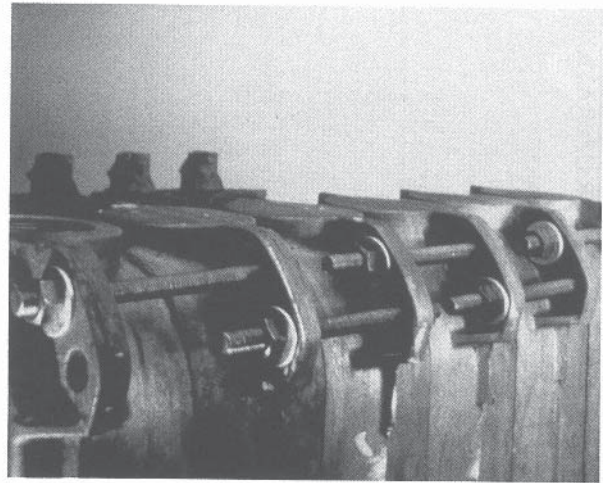
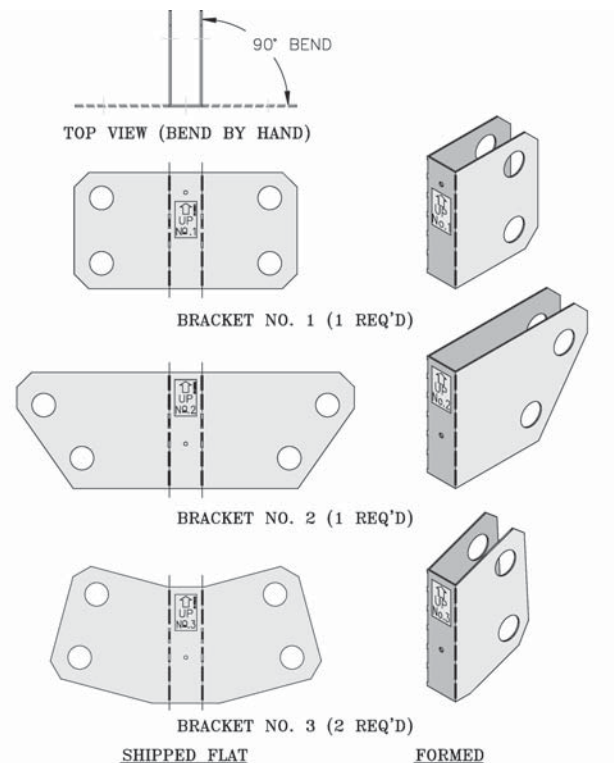


Figure 9: Draw-Up Rods (Alternating Pattern)



JACKET INTERMEDIATE PANEL MOUNTING BRACKETS  
(REQUIRED ON BOILER MODELS V1113 THRU V1123)

Figure 10: Jacket Intermediate Panel Mounting Brackets

(Required on Boiler Models V1113 thru V1123)

the draw-up rods from the upper to lower set of holes in draw-up lugs. Be certain that all sections are drawn up iron-to-iron at all three nipple ports.

BE SURE TO APPLY THE SEALANT to the groove in the ground joints between adjacent sections as the boiler operates with a positive pressure in the firebox and products of combustion will escape between sections unless the sections are properly sealed. The sealant should be applied before each section is placed on the assemblage.



## IMPORTANT

JACKET SUPPORT BRACKETS MUST BE ATTACHED TO THE APPROPRIATE CENTER SECTION DURING THE ASSEMBLY PROCESS ON BOILER SIZES V1113 THRU V1123. CHECK "SECTION ARRANGEMENT" CHART FOR LOCATION OF CENTER SECTION TO WHICH JACKET SUPPORT BRACKETS MUST BE ATTACHED (SEE FIGURE 8 ON PAGE 11).

- i. Open jacket carton(s), locate jacket intermediate panel mounting brackets No. 1, No. 2, and No. 3. Brackets are shipped flat and must be formed by hand, bend as shown in Figure 10.
- ii. WHEN APPROPRIATE SECTION is being assembled to block, slide brackets over draw-up rod lugs prior to inserting draw-up rods, washers and nuts. To prevent the brackets from turning during the draw-up process, insert a large punch or draw-up rod through second hole in each bracket. Refer to Figures 11 and 12 for proper location of each bracket and typical attachment.

- n. If a joint springs apart it must be re-drawn tight within four (4) hours of the time of application of Silastic to that joint.
- o. EXCESS LENGTH OF DRAW-UP RODS must not extend beyond front and rear section to ensure proper fit of jacket, adjust accordingly. After all sections have been drawn up, the draw-up rod nuts should be loosened until finger tight to prevent section damage due to thermal expansion.
- p. Now Proceed to Step C of this section on Page 16, Hydrostatic Test.

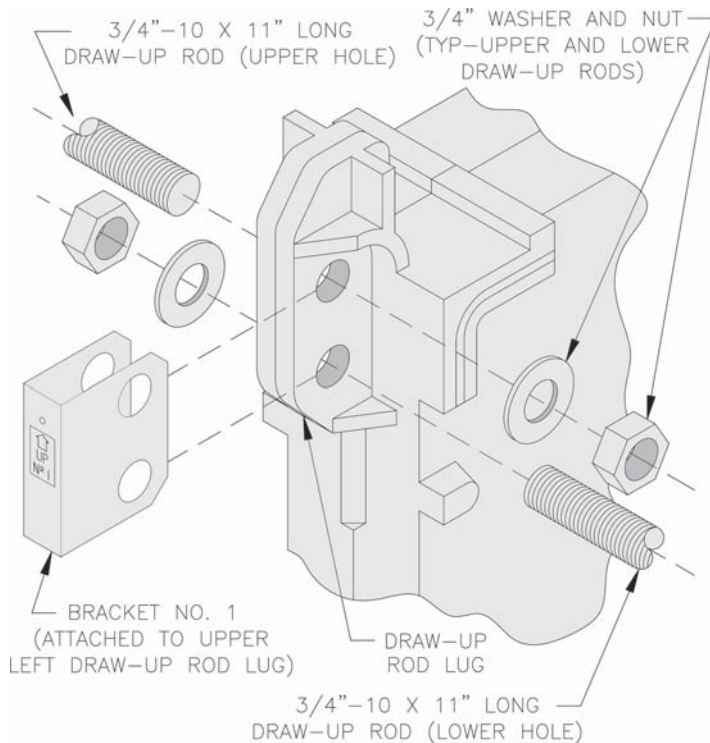
## 2. ASSEMBLY OF SECTIONS (HYDRAULIC DRAW-UP)

### V1104 through V1112 Section Assemblies

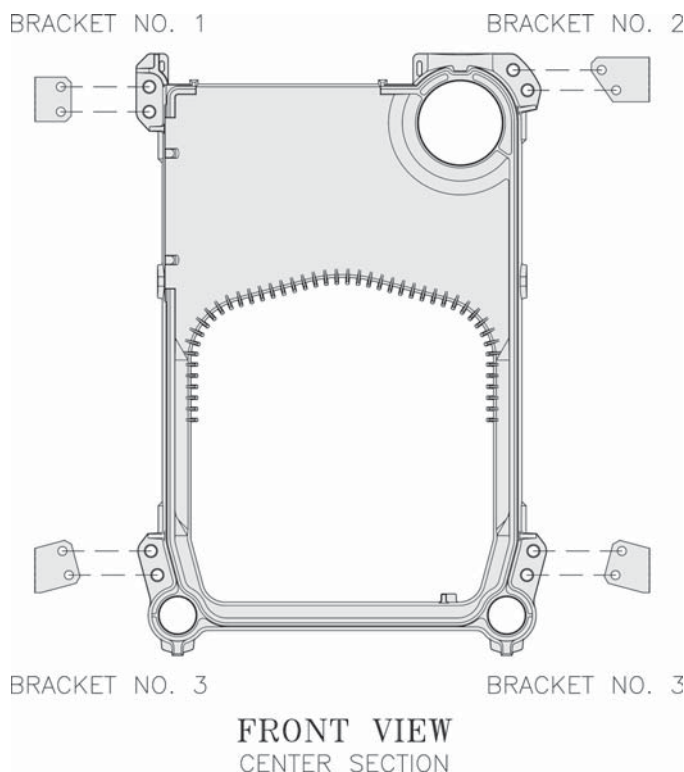
The entire assemblage may be drawn-up at one time using the hydraulic draw-up equipment providing the operation is completed within four (4) hours after application of the sealant.

### V1113 through V1123 Section Assemblies

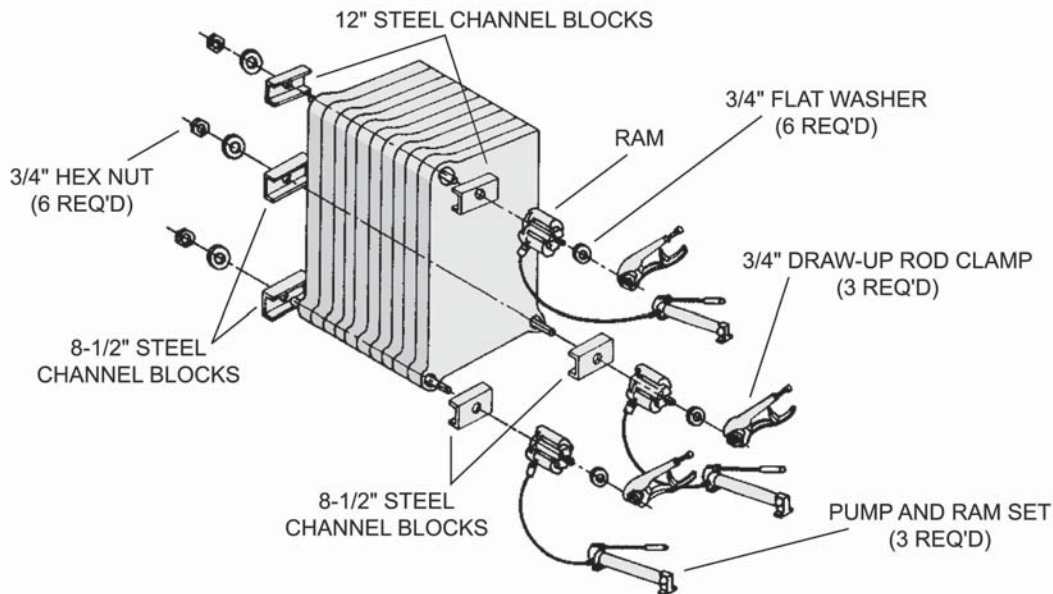
The total assemblage should be first drawn-up into two (2) sub-assemblies. Each sub-assembly may be drawn-up at one time using the hydraulic draw-up equipment providing the operation is completed within four (4) hours after application of the sealant.



**Figure 11: Bracket Placement**



**Figure 12: Bracket Attachment to Center Section**



**Figure 13: Hydraulic Draw-Up of Sections**

“Hydraulic Draw-up Equipment” is available through Burnham by ordering part number 6196008.

- a. Repeat steps 1a through 1j under “Field Assembled Sections (Manual Draw-Up).”
- b. Continue driving sections in place (in their respective order) until all sections are in the assemblage. Ground surfaces between adjoining sections should be spaced 1/4” to 3/8” apart. Spacing of more than 3/8” will limit number of sections that can be drawn up in one unit and could indicate cocked nipples.

### CAUTION

Be sure to apply the sealant to the groove in the ground joints between adjacent sections as the boiler operates with a positive pressure in the firebox and products of combustion will escape between sections unless the sections are properly sealed. The sealant should be applied before each section is placed on the assemblage.

On long boiler assemblies, it may be necessary to draw up a partial block if the entire boiler is not ready to be drawn up tight within four (4) hours of the first application of Silastic. If the block assembly time extends overnight, the partial block completed must be drawn up tight before leaving the boiler overnight. If a joint springs out, it must be re-drawn tight within four (4) hours of first application of Silastic to the joint.

- c. Insert the three 3/4” draw-up rods (and couplings, if appropriate) through the tapped holes in the rear section extending them through the tapped holes in the front section. Be sure to screw draw-up rods into couplings far enough to prevent stripping threads.
- d. Place a 12” long steel channel on each end of the upper draw-up rod and an 8 1/2” long steel channel on each end of the lower draw-up rods. Install nuts and washers on one end of the draw-up rods and the

hydraulic rams, washers and draw-up rod clamps on the other. See Figure 13.

### CAUTION

Care must be exercised to avoid applying pressure directly on threaded tappings on front and rear sections with Draw-up channels during assembly procedures.

Rods should be approximately centered in openings so that rods and couplings (when used) do not drag on pipe thread in end section tappings.

- e. Draw-Up Sections

Use hydraulic rams to draw up sections by applying pressure alternately on the draw-up rods. When rams reach stroke limit, release pressure in ram pumps and then move clamps to new position.

### WARNING

READ THE STATEMENTS BELOW BEFORE ATTEMPTING TO USE HYDRAULIC EQUIPMENT.

- RELEASE PRESSURE IN RAM PUMPS BEFORE ATTEMPTING TO REMOVE CLAMPS.
- DO NOT STAND IN LINE WITH DRAW-UP RODS AT EITHER END WHEN HYDRAULIC PRESSURE IS BEING APPLIED. AS A SAFETY MEASURE, ENDS OF DRAW-UP RODS SHOULD BE COVERED WHILE SECTIONS ARE BEING DRAWN IN CASE RODS SHOULD SNAP WHILE UNDER TENSION.
- DO NOT OPERATE RAM AGAINST DRAW-UP COUPLING.
- DO NOT OPERATE PUMP AFTER RAM HAS REACHED STROKE LIMIT.

- f. Continue to draw-up until all sections make contact at the ground joints.
- g. After all sections have been drawn up, but before removing the hydraulic rams and draw-up rods, the 11" long tie-rods must be installed.

Large draw-up rod lugs with dual holes are cast in the four (4) corners of each casting. Starting with the upper holes in the back section, install four (4) ¾" x 11" long tie rods along with washers and nuts. Continue installing the tie rods alternating from the upper to lower set of holes in draw-up lugs until front section is secured. Be certain that all sections are drawn up iron to iron at all three nipple ports. Tighten all tie rod nuts until finger tight to prevent section damage due to thermal expansion.

## IMPORTANT

Jacket Support Brackets must be attached to the appropriate center section during this process. Check "Section Arrangement" chart for location of center section to which jacket support brackets must be attached (see Figure 8).

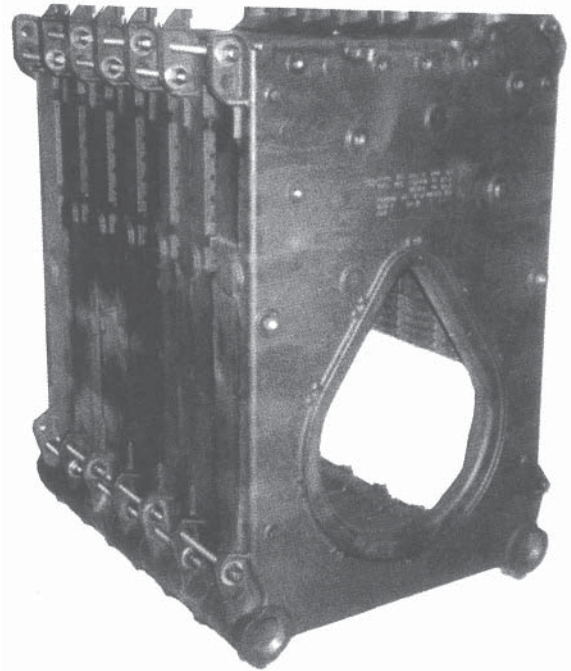
- i. Open jacket carton(s), locate jacket intermediate panel mounting brackets No. 1, No. 2, and No. 3. Brackets are shipped flat and must be formed by hand, bend as shown in Figure 10.
- ii. Slide brackets over draw-up rod lugs prior to inserting the 11" long tie rods, washers and nuts. Refer to Figures 11 and 12 for proper location of each bracket and typical attachment method.
- h. Excess length of draw-up rods must not extend beyond front and rear section to ensure proper fit of jacket, adjust accordingly.

**C. HYDROSTATIC TEST** - After the boiler sections have been assembled, it is essential that the boiler be hydrostatically tested before the canopy, flue cover plates, jacket, or piping is installed.

### 1. Tankless Heater Installation

If boiler is ordered with tankless heaters, install heaters with the gaskets provided. Table III on Page 28 gives the maximum number of heater permissible per assemblage and the heater ratings.

2. Plug all boiler tappings and fill entirely with cold water. To protect and safeguard the accuracy of



**Figure 14: Boiler Section Assemblage**

steam or water gauge supplied, **DO NOT INSTALL GAUGE UNTIL AFTER TESTING OF BOILER.**

3. All completed boilers shall satisfactorily pass the prescribed hydrostatic test.
  - a. **STEAM BOILERS:** The assembled boiler shall be subjected to a hydrostatic test of not less than 45 psig.
  - b. **HOT WATER BOILERS:** The assembled boiler shall be subjected to a hydrostatic test of not less than 1½ times the maximum allowable working pressure.
    - i. 50 psi mawp - minimum test pressure is 75 psig.
    - ii. 80 psi mawp - minimum test pressure is 120 psig.
4. **EXAMINE BOILER CAREFULLY, INSIDE AND OUTSIDE,** to insure against leaks from cocked nipples or through concealed breakage caused in shipping and handling. This precaution is for your protection and will simplify handling of necessary replacements and adjustment claims.
5. After making certain that there are no leaks, drain boiler and remove plugs for boiler trim and other connections.







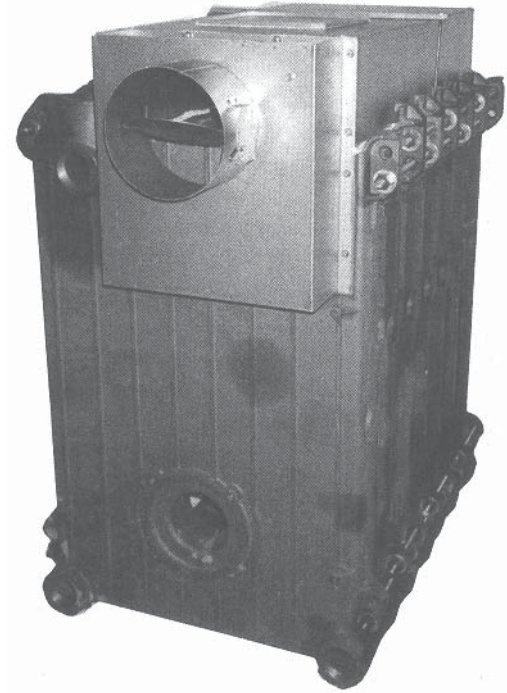
## SECTION III - INSTALLATION INSTRUCTIONS (continued)

### A. CANOPY/FLUE OUTLET ASSEMBLY, Refer to Figures 15, 16 and 17.

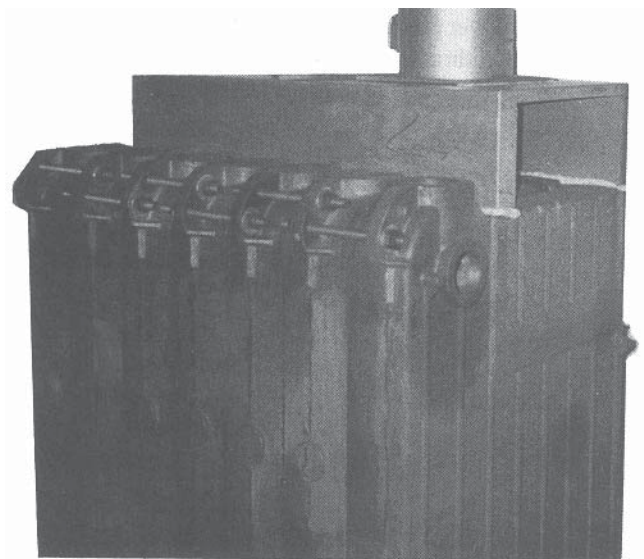
1. Open canopy carton.
2. Two piece canopies should be joined together using the 1/8" x 1" wide self-adhesive fiber gasket and seventeen (17) #10 x 1/2" sheet metal screws.
3. Attach the canopy bracket to the front end cap of canopy with four (4) #10 x 1/2" sheet metal screws.
4. Across the top of the front section and along the top ledges running back each side of the sections, place continuous 2" wide strips of cerafelt and overlap joints at front corners. Cerafelt strip should extend 1/4" beyond raised flange on rear surface of back section. Cut off excess.
5. Place the canopy on the sections.
6. Position rear flange (end with studs) of canopy flush with raised flange on rear of back section.
7. Loosely attach the canopy bracket to the lug on the front of the section assembly with 5/16" carriage bolt, flat washer and lock-nut.
8. Attach canopy hold down channels to center sections with appropriate canopy 'J' bolts. Insert threaded end through holes in channels and hook 'J' bolts on center section lugs (hooks should face forward). Loosely secure canopy with 5/16" flat washers, lock washers and brass nuts.
9. Check to see if rear flange of canopy is still flush with raised flange on back section. Tighten rear set of canopy 'J' bolts only.
10. Open either the rear flue outlet carton (standard) or top flue outlet carton (optional).
11. Attach the 1/8" x 1" wide self-adhesive fiber gasket to the surface of either the rear flue outlet damper assembly or rear flue outlet cover that mounts against the canopy and back section. Gasket must be centered over all attachment holes. Do not overlap corners, cut butt joints.
12. Attach either the rear flue outlet damper assembly or rear outlet canopy cover to the canopy with the six (6) 5/16" flat washers, lock-washers and brass nuts. Attach the rear flue outlet damper assembly or cover to the back section with the six (6) 5/16" flat washers and cap screws.
13. Tighten front canopy carriage bolt and remaining 'J' bolts until canopy is secure.
14. Attach the 1/8" x 1" wide self-adhesive fiber gasket to the surfaces of either the top flue outlet damper assembly or top outlet canopy cover that mounts against the canopy. Gasket must be centered over all attachment holes. Do not overlap corners, cut butt joints.

15. Secure either the top flue outlet damper assembly or top outlet canopy cover with #10 x 1/2" sheet metal screws.

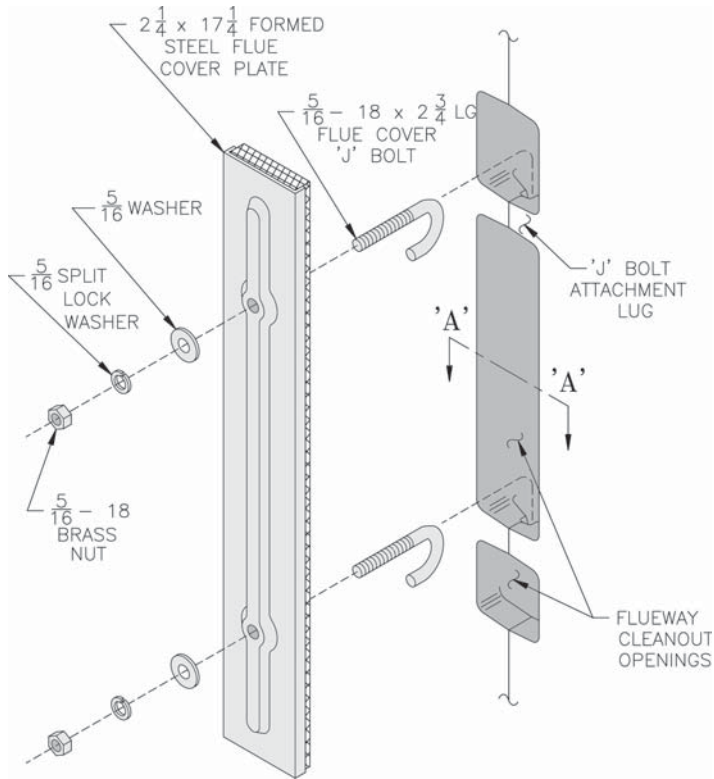
16. 1" thick piece of fiberglass insulation provided in canopy carton will be installed during jacket assembly, set aside until then.



**Figure 16: Canopy with Rear Flue Outlet Damper Assembly**



**Figure 17: Canopy with Top Flue Outlet Damper Assembly (Rear Cover Removed)**



**Figure 18: Flue Cover Plate Attachment**

**B. INSTALL FLUE COVER PLATES** over cleanout openings on left side of boiler as shown in Figure 18.

1. Locate the cover plates, carriage bolts, nuts and washers in the boiler assembly carton(s).
2. Remove insulation from two 3/8" diameter holes in flue cover plates using a 3/8" drill bit which can be rotated through insulation by hand.
3. Hook flue cover 'J' bolts over attachment lugs.
4. With one hand, hold top 'J' bolt between your index and middle fingers. With the other hand, hold flue plate on a slight inward angle, align top hole with end of 'J' bolt and force it through as far as possible. Repeat similar process for bottom 'J' bolt.
5. Holding threaded end of top 'J' bolt, pull outward and at the same time push flue cover plate against castings. Place one finger across 'J' bolt at base of flue cover plate hole. Place 5/16" washer, split lock washer and brass nut on end of 'J' bolt. Hand tighten only. Repeat similar process for bottom 'J' bolt.
6. Push upward on bottom edge of flue cover plate to eliminate sag in hardware. Tighten brass nuts with a deep socket or wrench until insulation on cover plate provides an adequate seal to casting. If after tightening, a gap is still evident where the sections join, apply silastic along top and bottom edge of insulation board.
7. Repeat steps 3 through 6 for mounting remaining flue cover plates.

**C. MOUNT REAR OBSERVATION PORT COVER,** Refer to Figure 15.

1. Apply a 1/4" bead of Silastic sealant along the groove on the inside face of the rear observation port cover.
2. Mount the rear observation port cover onto the rear section (with the word "Top" in the upright position) using the (4) 5/16"-18 X 1" cap screws and washers provided.

**D. INSPECT SEALS**

1. A visual inspection should be made of all sealed joints and repairs made if necessary. A darkened boiler room with a light source in the combustion space and canopy will aid this inspection.

**E. INSTALL THE CERAMIC FIBER FIREWALL PLATES** on the right side of the center sections starting at the front and working toward the back, see Figure 15 and 19. Firewall plates are shipped in the canopy carton, see chart below for quantities required.

1. There are two different types of firewall plates identified as "Front" and "Common". All builds start with one (1) "front" firewall plate and "common" firewall plates are added as the boiler grows in size.

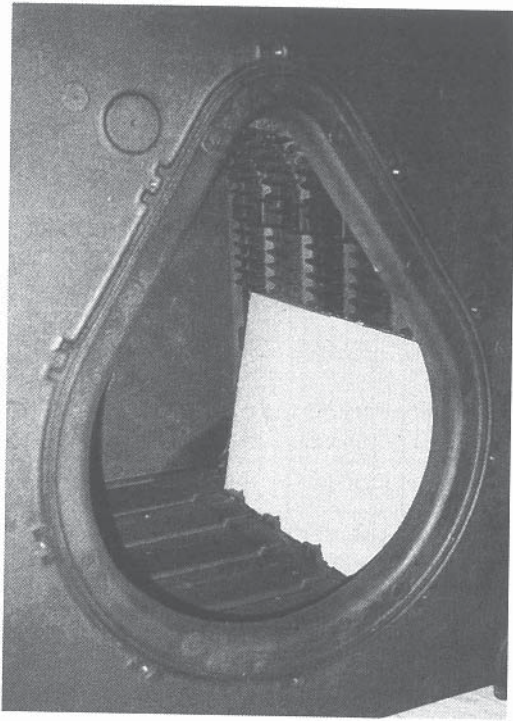
**IMPORTANT**

Models V1104 and V1106 Only. Cut-off 3/4" of excess material from rear edge of firewall plate to eliminate interference with rear target wall.

- Model V1104: Remove excess from front firewall plate.
  - Model V1106: Remove excess from common firewall plate.
2. Firewall plates have two (2) notches located along the bottom edge which interlock with lugs cast on each center section making them self positioning. The "front" firewall plate must be positioned as far forward as possible.

BOILER MODEL	FRONT FIREWALL PLATE	COMMON FIREWALL PLATE
V1104/1105	1	0
V1106/1107	1	1
V1108/1109	1	2
V1110/1111	1	3
V1112/1113	1	4
V1114/1123	1	5

3. Install firewall plates using silastic (provided) on each upper and lower edge of firewall plate where plate rests against section. Apply a minimum bead of 1/2" diameter to all contact points to form a good bond to the casting.



**Figure 19: Firewall Plates**

## F. BOILER PIPING

CONNECT SUPPLY AND RETURN PIPING TO HEATING SYSTEM.

### NOTICE

IT IS IMPORTANT THAT THE MINIMUM PIPING REQUIREMENTS AND ARRANGEMENTS BE COMPLIED WITH IN ORDER TO ENSURE MAXIMUM RELIABLE PERFORMANCE.

1. CLEARANCES - All steam and hot water pipes shall have clearances of at least ½" from all combustible construction.
2. With STEAM HEATING - GRAVITY RETURN see Figure 20. Consult I=B=R Installation and Piping Guide No. 200 for additional guidance.

### NOTICE

PARTICULAR ATTENTION SHOULD BE GIVEN TO THE CONSTRUCTION OF THE HARTFORD LOOP ON STEAM BOILERS. FIGURE 20 ILLUSTRATES THE CORRECT WAY TO CONSTRUCT THE STEAM HEADER.

3. With forced circulation HOT WATER HEATING, see Figure 21. Consult I=B=R Installation and Piping Guide No. 200 for additional guidance.
  - a. If this boiler is used in connection with refrigeration systems, the boiler must be installed so that the chilled medium is piped in parallel with the heating boiler using appropriate valves

to prevent the chilled medium from entering the boiler, see Figure 22. Also, consult I=B=R Installation and Piping Guides.

- b. If this boiler is connected to heating coils located in air handling units where they may be exposed to refrigerated air, the boiler piping must be equipped with flow control valves to prevent gravity circulation of boiler water during the operation of the cooling system.
- c. If tankless heaters are not used and if the boiler is to be operated in a system which has a large volume or excessive radiation where low boiler water temperatures may be encountered (i.e. converted gravity circulation system, etc.) the use of a boiler water bypass is recommended to maintain optimum operation.

Remove the circulator and install a pipe tee between the circulator and boiler return along with a second tee in the supply piping as shown in Figure 23. The bypass should be the same size as the supply and return lines with valves located in the bypass and supply outlet as illustrated in Figure 23 in order to regulate water flow for maintenance of higher boiler water temperature. Set the by-pass and boiler supply valves to a half throttle position to start. Operate boiler until the system water temperature is at a normal operating range.

Adjust the valves to provide 180° to 200°F supply water temperature. Opening the boiler supply valve will raise the system temperature, while opening the by-pass valve will lower the system supply temperature.

### WARNING

A hot water boiler installed above radiation level must be provided with a low water cutoff device as part of the installation.

**OXYGEN CORROSION:**

OXYGEN CONTAMINATION OF THE BOILER WATER WILL CAUSE CORROSION OF THE IRON AND STEEL BOILER COMPONENTS, WHICH CAN LEAD TO FAILURE. AS SUCH, ANY SYSTEM MUST BE DESIGNED TO PREVENT OXYGEN ABSORPTION IN THE FIRST PLACE OR PREVENT IT FROM REACHING THE BOILER.

PROBLEMS CAUSED BY OXYGEN CONTAMINATION OF BOILER WATER ARE NOT COVERED BY BURNHAM'S STANDARD WARRANTY.

There are many possible causes of oxygen contamination such as:

- i. Addition of excessive make-up water as a result of system leaks.
- ii. Absorption through open tanks and fittings.



BOILER MODEL	PIPING SIZE						RISER SPACING				
	① RISER	② RETURN	③ HEADER	④ EQUALIZER	⑤ BLOWOFF	'A'	'B'	'C'	'D'	'E'	
	(QTY) SIZE										
V1104	(1)	4"	2"	4"	2½"	1"	—	—	—	—	—
V1105	(1)	4"	2"	4"	2½"	1"	—	—	—	—	—
V1106	(2)	4"	2½"	6"	2½"	1"	31⅛"	—	—	—	—
V1107	(2)	4"	2½"	6"	2½"	1¼"	37¼"	—	—	—	—
V1108	(2)	4"	2½"	6"	2½"	1¼"	43⅜"	—	—	—	—
V1109	(2)	4"	2½"	6"	2½"	1¼"	49½"	—	—	—	—
V1110	(3)	4"	2½"	6"	2½"	1¼"	24¾"	30⅞"	—	—	—
V1111	(3)	4"	3"	8"	4"	1¼"	37"	24¾"	—	—	—
V1112	(3)	4"	3"	8"	4"	1¼"	37"	30⅞"	—	—	—
V1113	(3)	4"	3"	8"	4"	1½"	37"	37"	—	—	—
V1114	(4)	4"	3"	8"	4"	1½"	24¾"	24½"	30⅞"	—	—
V1115	(4)	4"	3"	8"	4"	1½"	24¾"	24½"	37"	—	—
V1116	(4)	4"	3"	8"	4"	1½"	30⅞"	36¾"	24¾"	—	—
V1117	(4)	4"	3"	8"	4"	1½"	30⅞"	36¾"	30⅞"	—	—
V1118	(5)	4"	3"	8"	4"	1½"	30⅞"	24½"	24½"	24¾"	—
V1119	(5)	4"	3"	10"	4"	1½"	30⅞"	24½"	24½"	30⅞"	—
V1120	(5)	4"	3"	10"	4"	1½"	30⅞"	24½"	36¾"	24¾"	—
V1121	(5)	4"	3"	10"	4"	1½"	30⅞"	24½"	36¾"	30⅞"	—
V1122	(6)	4"	3"	10"	4"	1½"	30⅞"	24½"	24½"	24½"	24¾"
V1123	(6)	4"	3"	10"	4"	1½"	30⅞"	24½"	24½"	24½"	30⅞"

NOTES:

1. ALL PIPING IS SCHEDULE 40.

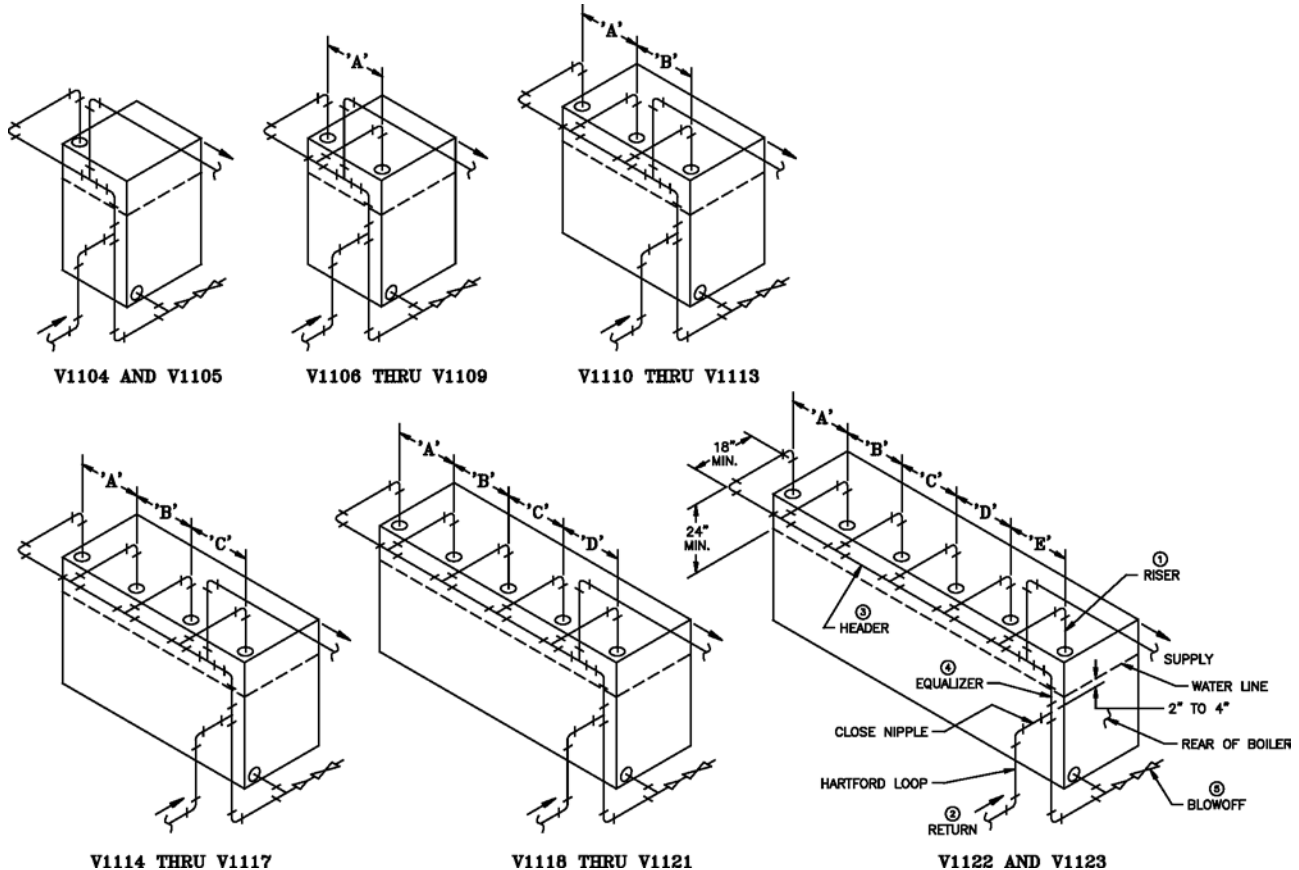
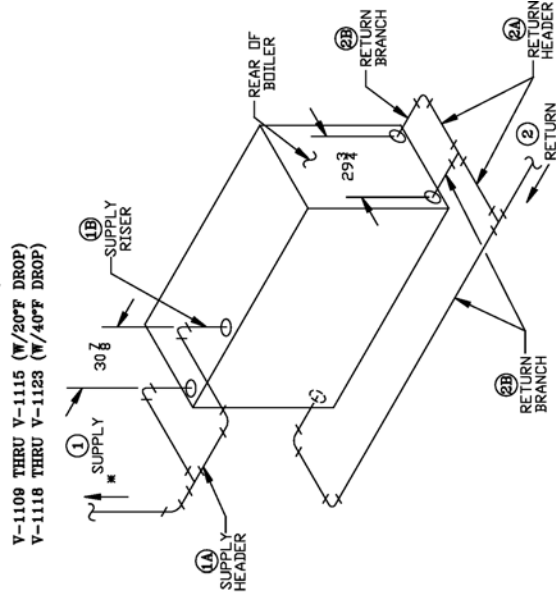
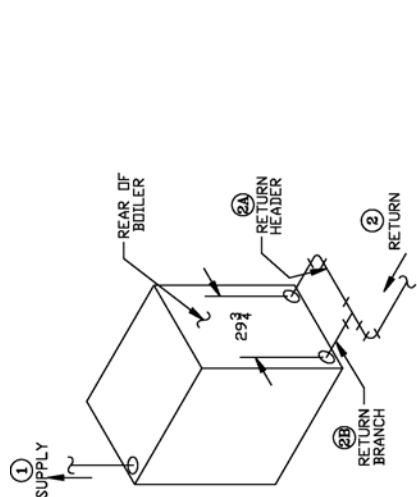


Figure 20 - Minimum Piping Requirements V11 Series Steam Boilers - Gravity Return

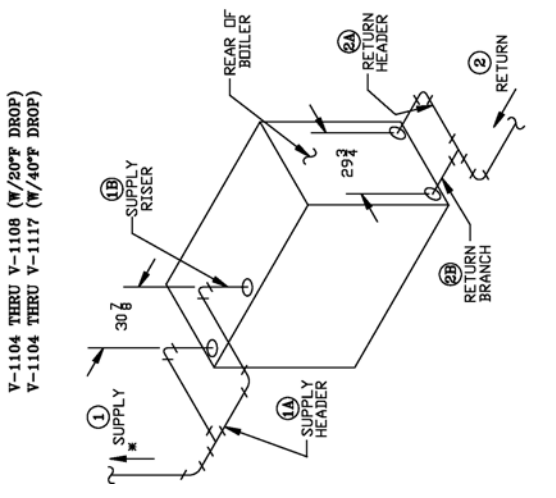
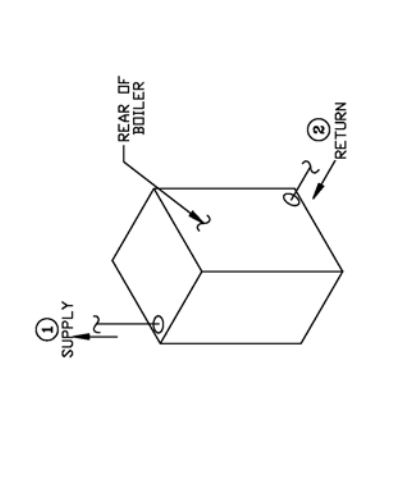


BOILER MODEL	SUPPLY PIPING SIZE						RETURN PIPING SIZE					
	① SUPPLY		①A SUPPLY HEADER		①B SUPPLY RISER (CITY SIZE)		② RETURN		②A RETURN HEADER		②B RETURN BRANCH (CITY SIZE)	
	20°F DROP	40°F DROP	20°F DROP	40°F DROP	20°F DROP	40°F DROP	20°F DROP	40°F DROP	20°F DROP	40°F DROP	20°F DROP	40°F DROP
V1104	2 1/2"	2"	—	—	—	—	2 1/2"	2"	—	—	—	—
V1105	2 1/2"	2"	—	—	—	—	2 1/2"	2"	—	—	—	—
V1106	2 1/2"	2"	—	—	—	—	2 1/2"	2"	—	—	—	—
V1107	3"	2"	—	—	—	—	3"	2"	—	—	—	—
V1108	3"	2"	—	—	—	—	3"	2"	—	—	—	—
V1109	4"	2 1/2"	—	—	—	—	4"	2 1/2"	—	—	(2) 3"	—
V1110	4"	2 1/2"	—	—	—	—	4"	2 1/2"	—	—	(2) 3"	—
V1111	4"	2 1/2"	—	—	—	—	4"	2 1/2"	—	—	(2) 3"	—
V1112	4"	3"	—	—	—	—	4"	3"	—	—	(2) 3"	—
V1113	4"	3"	—	—	—	—	4"	3"	—	—	(2) 3"	—
V1114	4"	3"	—	—	—	—	4"	3"	—	—	(2) 3"	—
V1115	4"	3"	—	—	—	—	4"	3"	—	—	(2) 3"	—
V1116	5"	3"	—	—	(2) 3"	—	5"	3"	—	—	(2) 3"	—
V1117	5"	3"	—	—	(2) 3"	—	5"	3"	—	—	(2) 3"	—
V1118	5"	4"	—	—	(2) 4"	—	5"	4"	—	—	(3) 3" (2) 3"	—
V1119	5"	4"	—	—	(2) 4"	—	5"	4"	—	—	(3) 3" (2) 3"	—
V1120	5"	4"	—	—	(2) 4"	—	5"	4"	—	—	(3) 3" (2) 3"	—
V1121	5"	4"	—	—	(2) 4"	—	5"	4"	—	—	(3) 3" (2) 3"	—
V1122	5"	4"	—	—	(2) 4"	—	5"	4"	—	—	(3) 3" (2) 3"	—
V1123	5"	4"	—	—	(2) 4"	—	5"	4"	—	—	(3) 3" (2) 3"	—

- NOTES: 1. ALL PIPING IS SCHEDULE 40.  
 2. PIPE SIZES LISTED ARE BASED ON A 20°F OR 40°F DIFFERENTIAL (TEMPERATURE DROP). SELECT ONE TO MATCH APPLICATION.  
 \* 3. SWING JOINT ON TWO RISER SYSTEMS MAY BE PIPED OVER THE TOP OF THE RTHI FR IF SPAC.F IS LIMITED.

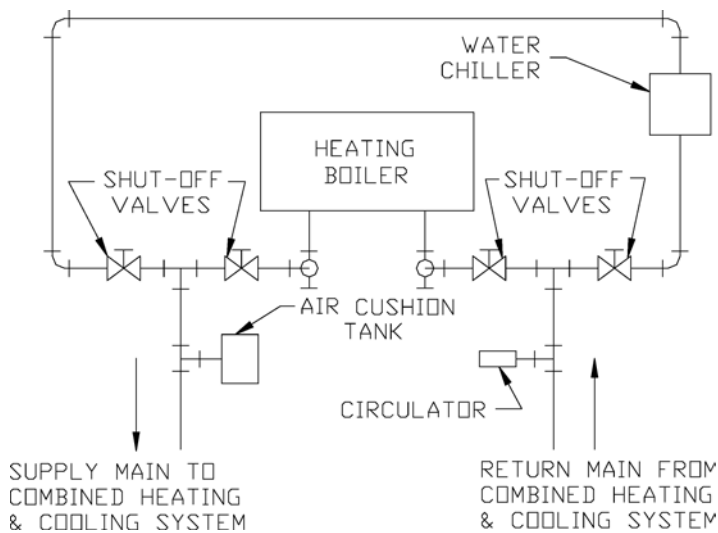


V-1118 THRU V-1123 (W/20°F DROP)

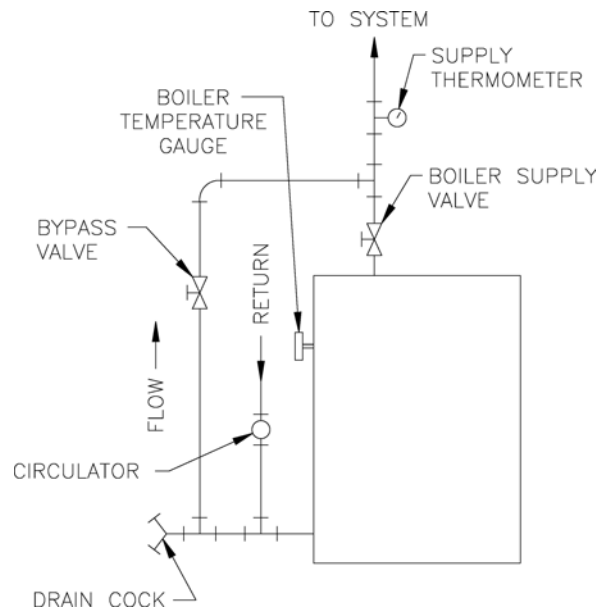


V-1116 AND V-1117 (W/20°F DROP)

Figure 21 - Minimum Piping Requirements V11 Series Water Boilers



**Figure 22: Recommended Piping for Combination Heating & Cooling (Refrigeration) Systems Water Boilers**



**Figure 23: Recommended Bypass Piping Water Boilers**

- iii. Oxygen permeable materials in the distribution system.

IN ORDER TO ENSURE LONG PRODUCT LIFE, OXYGEN SOURCES SHOULD BE ELIMINATED. THIS CAN BE ACCOMPLISHED BY TAKING THE FOLLOWING MEASURES:

- i. Repairing system leaks to eliminate the need for addition of make-up water.
- ii. Eliminating open tanks from the system.
- iii. Eliminating and/or repairing fittings which allow oxygen absorption.
- iv. Use of non-permeable materials in the distribution system.
- v. Isolating the boiler from the system water by installing a heat exchanger.

## G. JACKET ASSEMBLY

FOR V1104 thru 1112 JACKET ASSEMBLY DRAWING, SEE FIGURE 24.

FOR V1113 thru 1123 JACKET ASSEMBLY DRAWING, SEE FIGURE 25.

1. Open jacket carton(s) and jacket hardware package. Unless otherwise stated, all jacket components are fastened with #8 x 1/2" hex head sheet metal screws. Do not drive sheet metal screws tight until jacket assembly is complete.
2. Remove square knockout from jacket rear panel. To remove knockout, use a single hacksaw blade with handle or aviation snips to cut metal tabs between slotted holes.

3. Attach jacket front panel to front section and jacket rear panel to back section using the eight (8) #10 self tapping screws. Tighten these screws securely.
4. JACKET INTERMEDIATE PANEL ATTACHMENT - required on V1113 thru 1123 jacket assemblies only. Use two (2) sheet metal screws each to secure jacket intermediate panels to brackets previously attached during the section assembly process. Tighten these screws securely. For bracket attachment refer to Section II, Step B, Paragraph (m) on Page 12.
5. Each jacket channel has a five (5) digit identification number stamped on the bottom flange. The last two (2) digits identify their nominal length. Refer to single and multiple channel usage charts, See Figures 26 and 27.
  - a. Attach each jacket 'J' channel to one of the jacket 'U' channels of equal length (last two digits match) as shown in the exploded jacket detail on each of the jacket assembly drawings.
  - b. A support bracket with adjustable leg is required on 'J'/'U' channel assemblies 46" and longer. Attach each support bracket with three (3) sheet metal screws and thread adjustable support leg (1/4" cap screw) into bottom of support bracket approximately 1" as shown in exploded jacket detail.
6. Channel Attachment - V1104 thru 1112 Jacket Assembly (refer to single channel usage chart, Figure 26).
  - a. Attach each 'J'/'U' channel assembly to the bottom of the front and rear jacket panels using four (4) sheet metal screws.

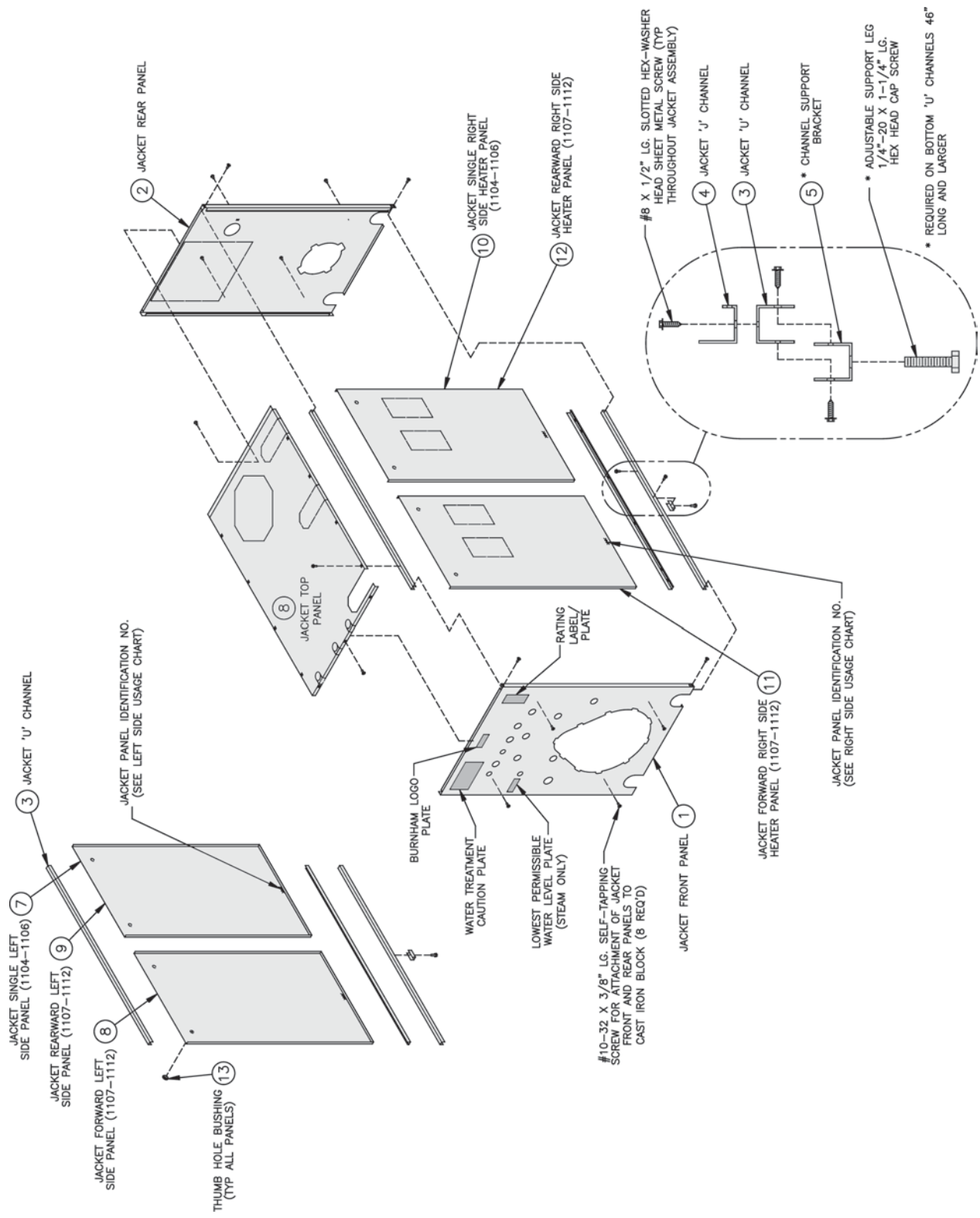


Figure 24: V11 Series Jacket Assembly (Boiler Models V1104 Thru V1112)



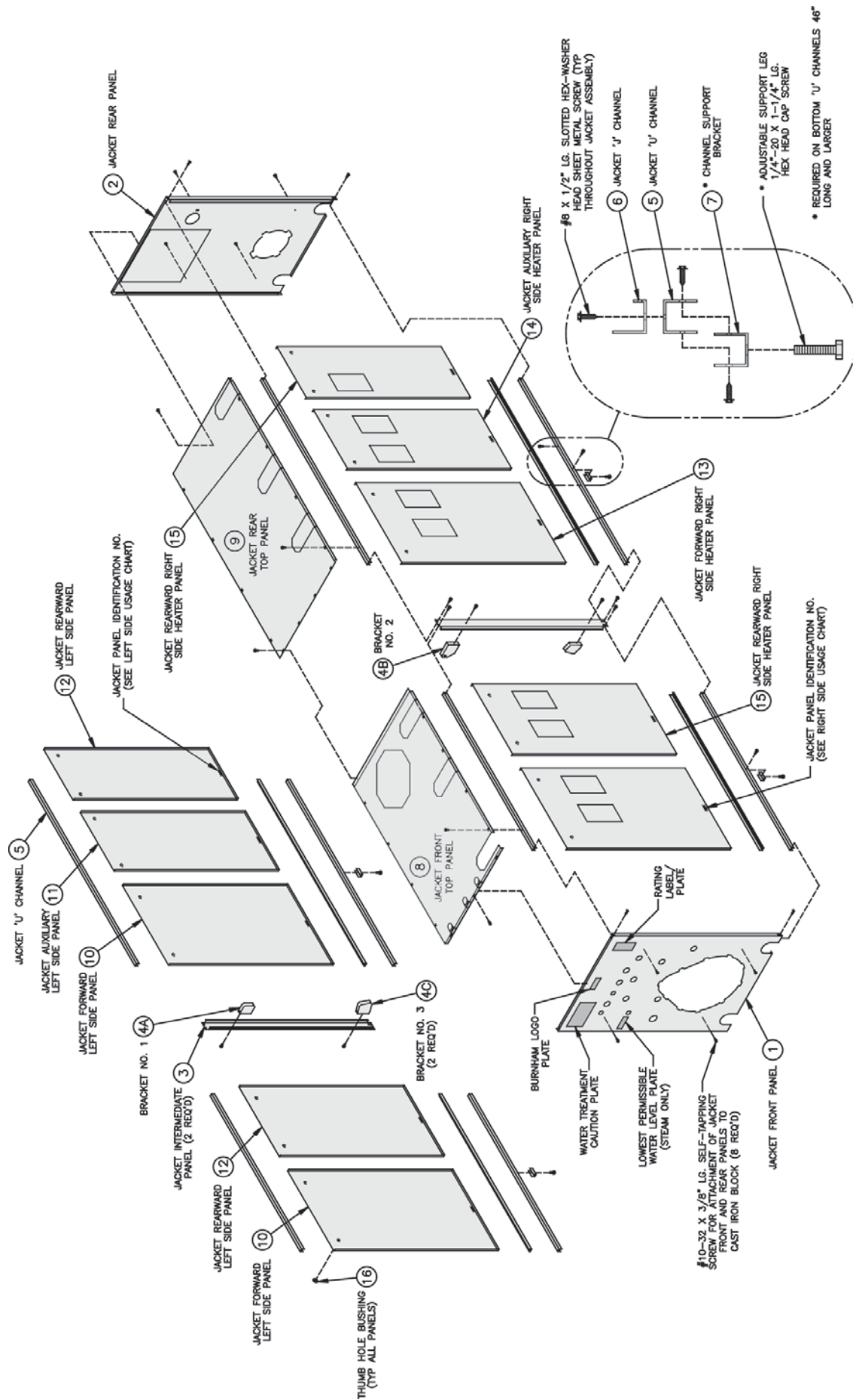


Figure 25: V11 Series Jacket Assembly (Boiler Models V1113 Thru V1123)

- b. On 'J'/'U' channel assemblies with support bracket, adjust support leg (1/4" cap screw) down until leg touches floor, then add 1/2 to 1 full additional turn.
- c. Attach each remaining 'U' channel to the top of the front and rear jacket panels ('U' side down) using (2) sheet metal screws.

SINGLE CHANNEL USAGE		
BOILER SIZE	'U' CHANNEL NO. (4 REQ'D)	'J' CHANNEL NO. (2 REQ'D)
V1104	U-26	J-26
V1105	U-32	J-32
V1106	U-38	J-38
V1107	U-44	J-44
V1108	U-50	J-50
V1109	U-56	J-56
V1110	U-63	J-63
V1111	U-69	J-69
V1112	U-75	J-75

**Figure 26: Single Channel Usage Chart**

- 7. **Channel Attachment - V1113 thru 1123 Jacket Assembly** (refer to multiple channel usage chart, Figure 27).
  - a. Attach the appropriate length 'J'/'U' channel assembly to the bottom of the front and intermediate jacket panels using four (4) sheet metal screws. Repeat for opposite side.
  - b. Attach remaining 'J'/'U' channel assemblies between the bottom of intermediate and rear jacket panels on each side in the same manner.
  - c. On 'J'/'U' channel assemblies with support bracket, adjust support leg (1/4" cap screw) down until leg touches floor, then add 1/2 to 1 full additional turn.
  - d. Using two (2) sheet metal screws each, attach the remaining 'U' channels ('U' side down) between the tops of the front, intermediate and rear jacket panels according to channel length.
- 8. Position the loose piece of 1" thick x 36" wide fiberglass insulation, provided in the canopy carton, against left side 'U' channel(s), across top of canopy and down over right side between canopy and supply piping. Remove insulation from collar on top flue outlet damper assembly, if so equipped.

MULTIPLE CHANNEL USAGE				
BOILER SIZE	FRONT 'U' CHANNEL NO. (4 REQ'D.)	FRONT 'J' CHANNEL NO. (2 REQ'D.)	REAR 'U' CHANNEL NO. (4 REQ'D.)	REAR 'J' CHANNEL NO. (2 REQ'D.)
V1113	U-46	J-46	U-34	J-34
V1114	U-46	J-46	U-40	J-40
V1115	U-46	J-46	U-46	J-46
V1116	U-52	J-52	U-46	J-46
V1117	U-52	J-52	U-52	J-52
V1118	U-52	J-52	U-58	J-58
V1119	U-65	J-65	U-52	J-52
V1120	U-65	J-65	U-58	J-58
V1121	U-65	J-65	U-65	J-65
V1122	U-65	J-65	U-71	J-71
V1123	U-65	J-65	U-77	J-77

**Figure 27: Multiple Channel Usage Chart**

- 9. **Jacket Top Panel Attachment**
  - a. On the top flue outlet damper assembly, remove octagon shaped knockout. To remove knockout, use a single hacksaw blade with handle or aviation snips to cut metal tabs between slotted holes.
  - b. Remove knockout(s) for necessary supply piping in a similar manner.
  - c. Attach jacket top panel(s) to the front panel, rear panel and upper 'U' channels with sheet metal screws. Secure seam on two piece top panel (V1113-1123) with sheet metal screws.

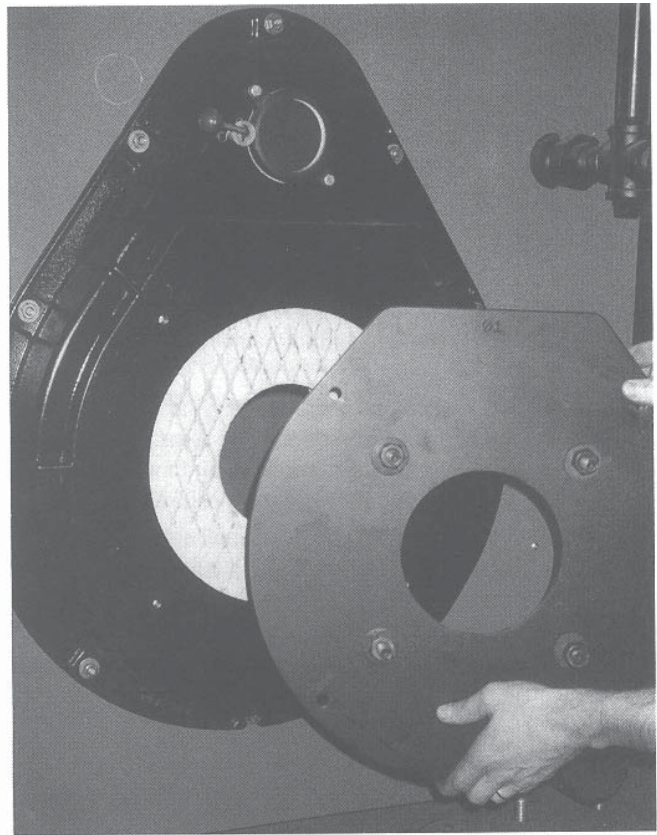
LEFT SIDE USAGE CHART						
BOILER SIZE	SINGLE LEFT SIDE PANEL	MULTIPLE SIDE PANELS (FRONT TO REAR)				
		PANEL NO. 1	PANEL NO. 2	PANEL NO. 3	AUXILIARY PANEL	PANEL NO. 4
		FORWARD LEFT SIDE PANEL	REARWARD LEFT SIDE PANEL	FORWARD LEFT SIDE PANEL	AUXILIARY LEFT SIDE PANEL	REARWARD LEFT SIDE PANEL
V1104	SLS24	----	----	----	----	----
V1105	SLS30	----	----	----	----	----
V1106	SLS36	----	----	----	----	----
V1107	----	FLS27	RLS15	----	----	----
V1108	----	FLS27	RLS21	----	----	----
V1109	----	FLS27	RLS27	----	----	----
V1110	----	FLS27	RLS33	----	----	----
V1111	----	FLS39	RLS27	----	----	----
V1112	----	FLS39	RLS33	----	----	----
V1113	----	FLS27	RLS17	FLS17	----	RLS15
V1114	----	FLS27	RLS17	FLS17	----	RLS21
V1115	----	FLS27	RLS17	FLS17	----	RLS27
V1116	----	FLS33	RLS17	FLS29	----	RLS15
V1117	----	FLS33	RLS17	FLS29	----	RLS21
V1118	----	FLS33	RLS17	FLS29	----	RLS27
V1119	----	FLS33	RLS29	FLS29	----	RLS21
V1120	----	FLS33	RLS29	FLS29	----	RLS27
V1121	----	FLS33	RLS29	FLS29	----	RLS33
V1122	----	FLS33	RLS29	FLS29	ALS24	RLS15
V1123	----	FLS33	RLS29	FLS29	ALS24	RLS21

**Figure 28: Left Side Panel Usage Chart**

- 10. **Install Jacket Side Panels**
  - a. Snap black thumb hole bushings into all side panel holes.
  - b. Use left side panel and right side panel usage charts to determine correct positions of side panels. The five (5) digit panel identification numbers shown in the charts are also stamped along the bottom edge of each panel. Refer to Figures 28 and 29.
  - c. Forward and auxiliary panels have reverse bend flanges on one side of panel. These panels must be installed prior to rearward panels.

RIGHT SIDE USAGE CHART						
BOILER SIZE	SINGLE RIGHT SIDE HEATER PANEL	MULTIPLE SIDE PANELS (FRONT TO REAR)				
		PANEL NO. 1	PANEL NO. 2	PANEL NO. 3	AUXILIARY PANEL	PANEL NO. 4
		FORWARD RIGHT SIDE HEATER PANEL	REARWARD RIGHT SIDE HEATER PANEL	FORWARD RIGHT SIDE HEATER PANEL	AUXILIARY RIGHT SIDE HEATER PANEL	REARWARD RIGHT SIDE HEATER PANEL
V1104	SRH24	---	---	---	---	---
V1105	SRH30	---	---	---	---	---
V1106	SRH36	---	---	---	---	---
V1107	---	FRH27	RRH15	---	---	---
V1108	---	FRH27	RRH21	---	---	---
V1109	---	FRH27	RRH27	---	---	---
V1110	---	FRH27	RRH33	---	---	---
V1111	---	FRH39	RRH27	---	---	---
V1112	---	FRH39	RRH33	---	---	---
V1113	---	FRH27	RRH17	FRH17	---	RRH15
V1114	---	FRH27	RRH17	FRH17	---	RRH21
V1115	---	FRH27	RRH17	FRH17	---	RRH27
V1116	---	FRH33	RRH17	FRH29	---	RRH15
V1117	---	FRH33	RRH17	FRH29	---	RRH21
V1118	---	FRH33	RRH17	FRH29	---	RRH27
V1119	---	FRH33	RRH29	FRH29	---	RRH21
V1120	---	FRH33	RRH29	FRH29	---	RRH27
V1121	---	FRH33	RRH29	FRH29	---	RRH33
V1122	---	FRH33	RRH29	FRH29	ARH24	RRH15
V1123	---	FRH33	RRH29	FRH29	ARH24	RRH21

**Figure 29: Right Side Panel Usage Chart**



**Figure 30: Burner Mounting Plate and Burner Adapter Plate**

- d. If boiler is equipped with tankless heaters they should be installed at this time if they were not installed for hydrostatic test outlined on Page 14.
- e. Install left side panels into position by inserting top of panel into upper 'U' channel, pushing bottom of panel in toward boiler, and sliding panel down into bottom 'J' channel.
- f. Remove the knockouts necessary for tankless heater operation on right side panels.
- g. Install right side panels.

- 11. Attach the 'Burnham Logo' plate to the front panel by peeling off the paper backing and lining the tabs up with the jacket slots. Apply pressure to face of logo to set adhesive.
- 12. Attach the Code Name Plate/Rating Label and Water Treatment Caution Plate (both are in the instructions envelope) to the front panel.
- 13. On steam boilers, attach lowest permissible water level plate (from steam trim carton) to the front panel using sheet metal screws.
- 14. Tighten all sheet metal screws to complete jacket assembly.

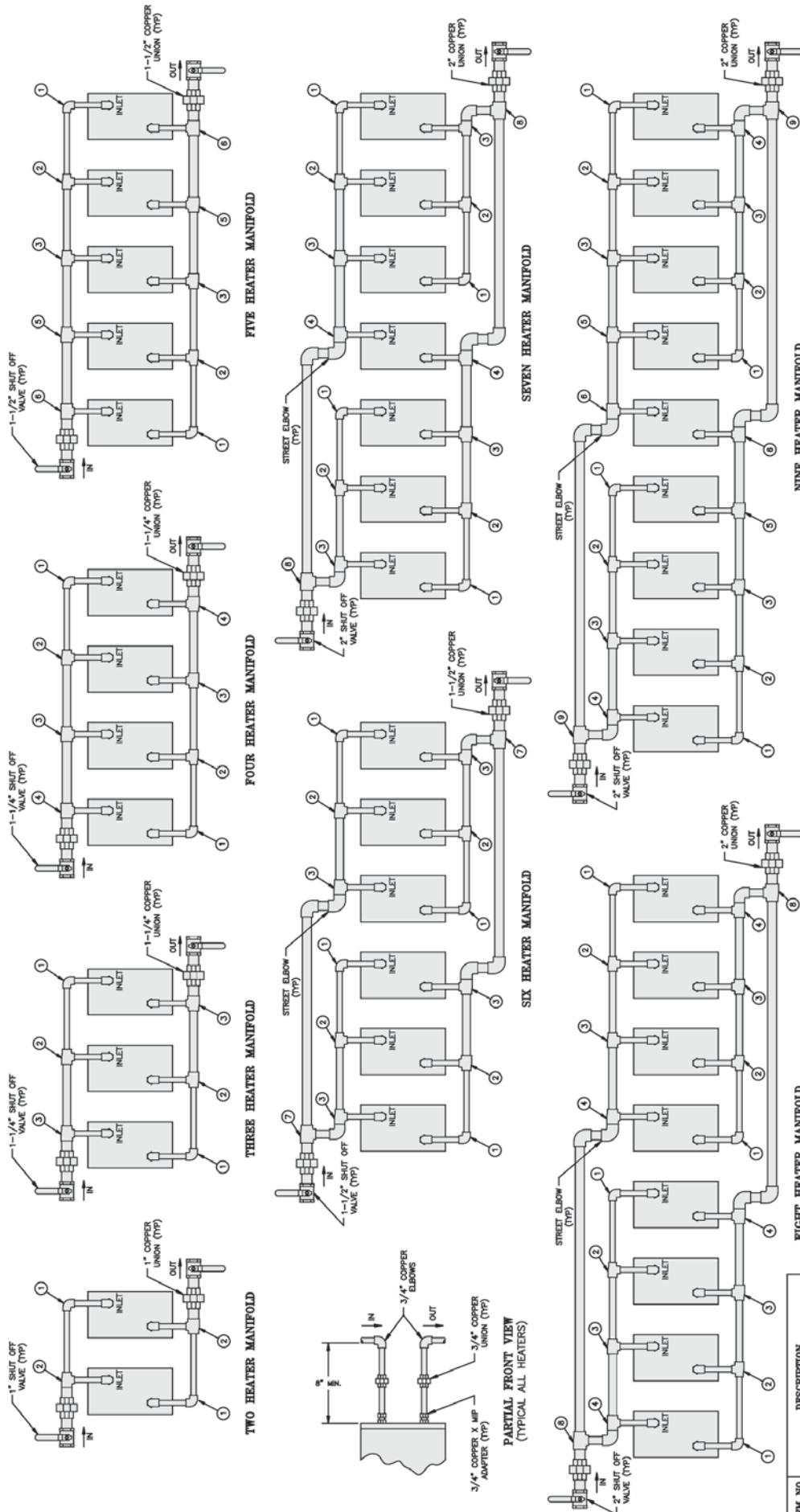
**H. MOUNT BURNER MOUNTING PLATE, refer to Figures 15 and 30.**

- 1. Install ten (10) 5/16" x 2" long tap-end studs with the short length of threads into the boiler front section.

**I. Mount Burner Adapter Plate to Burner Mounting Plate**

- 1. In most cases the burner adapter plate carton for the specified burner will be provided by Burnham. A few burners require special adapters that will be provided with the burner.
- 2. If adapter is provided by Burnham, open carton and remove contents. Apply four (4) small dabs of silastic on rear surface of adapter plate to temporarily hold gasket in place. Hold adapter plate in position against burner mounting plate, align holes and secure with four (4) 3/8" lock washers and 3/8" - 16 x 7/8" lg. cap screws.
- 3. If adapter is furnished with burner, follow manufactures instructions using gasket material and hardware provided with burner.
- 4. Use a hole saw or knife to cut burner plate insulation to match hole size on burner adapter plate for insertion of burner air tube.

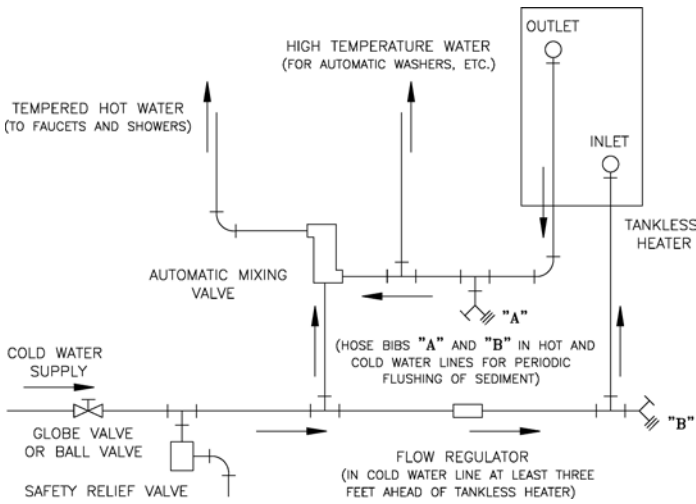




NOTES:  
 1. IT IS IMPORTANT THAT WATER HEATERS BE CENTRALLY LOCATED IN BOILERS.  
 2. IT IS IMPORTANT THAT WATER HEATER MANIFOLDS BE REMOVABLE TO ALLOW FOR HEATER REPAIR OR REPLACEMENT. ALSO REMOVAL OF JACKET RIGHT SIDE PANELS FOR BOILER REPAIR AND INSPECTION. THEREFORE, THE RECOMMENDED USE AND PLACEMENT OF SHUT OFF VALVES AND UNIONS ON ALL MANIFOLD ASSEMBLIES WILL PROVIDE EASY ACCESS FOR FUTURE SERVICING.

ITEM NO.	DESCRIPTION
1	3/4" COPPER ELBOW
2	1" X 3/4" X 3/4" COPPER TEE
3	1-1/4" X 1" X 3/4" COPPER TEE
4	1-1/2" X 1-1/4" X 3/4" COPPER TEE
5	1-1/2" X 1-1/2" X 3/4" COPPER TEE
6	1-1/2" X 1-1/4" X 1-1/4" COPPER TEE
7	2" X 1-1/2" X 1-1/4" COPPER TEE
8	2" X 1-1/2" X 1-1/4" COPPER TEE

Figure 31: Minimum Piping Recommendations for V11 Series Tankless Heater Manifolds



**Figure 32 - Schematic Tankless Heater Piping**

- J. For boilers with no tankless heaters, proceed to Step M (Install Steam Trim) or N (Install Water Trim).
- K. For boilers with tankless heaters, install the tankless heater manifolds according to Figure 31, on page 27.

**IMPORTANT**

Water heater manifolds must be removable to allow for heater repair and replacement, also for the removal of jacket right side panels for boiler repair and inspection. Therefore, the recommended use and placement of shut off valves and unions on all manifold assemblies is crucial to providing easy access for future servicing.

- L. CONNECT TANKLESS HEATER PIPING AS SHOWN IN Figure 32. See Table III for Tankless Heater Ratings.

THE FOLLOWING GUIDELINES SHOULD BE FOLLOWED WHEN PIPING THE TANKLESS HEATER:

1. Flow Regulation

If flow through the heater is greater than its rating, the supply of adequate hot water may not be able to keep up with the demand. For this reason a FLOW REGULATOR matching the heater rating should be installed in the cold waterline to the heater. Refer to Figure 32 for piping recommendations. The flow regulator should preferably be located below the inlet to the heater and a minimum of 3 feet away from the inlet so that the regulator is not subjected to excess temperatures that may occur during “off” periods when it is possible for heat to be conducted back through the supply line. The flow regulator also limits the flow of supply water regardless of inlet pressure variations in the range of 20 to 125 psi.

2. Tempering of Hot Water

**WARNING**

Install a mixing valve at the tankless heater outlet to avoid risk of burns or scalding due to excessively hot water at the fixture. Refer to Figure 32 for piping recommendations. Adjust and maintain the mixing valve in accordance with manufacturers instructions.

Installation of a tempering or mixing valve will also lengthen the delivery of the available hot water by mixing some cold water with the hot. In addition, savings of hot water will be achieved since the user will not waste as much hot water while seeking water temperatures to his liking. Higher temperature hot water required by dishwashers and automatic washers is possible by piping the hot water from the heater prior to entering the mixing valve. The mixing valve should be “trapped” by installing it below the cold water inlet to heater to prevent lime formation in the valve.

**TANKLESS HEATER RATINGS \***  
(STEAM AND WATER)

BOILER MODEL	NUMBER OF V11-2 HEATERS INSTALLED								
	1	2	3	4	5	6	7	8	9
V1104	8	-	-	-	-	-	-	-	-
V1105	8	16	-	-	-	-	-	-	-
V1106	8	16	-	-	-	-	-	-	-
V1107	8	16	24	-	-	-	-	-	-
V1108	8	16	24	-	-	-	-	-	-
V1109	8	16	24	32	-	-	-	-	-
V1110	8	16	24	32	-	-	-	-	-
V1111	8	16	24	32	-	-	-	-	-
V1112	8	16	24	32	40	-	-	-	-
V1113	8	16	24	32	40	-	-	-	-
V1114	8	16	24	32	40	-	-	-	-
V1115	8	16	24	32	40	48	-	-	-
V1116	8	16	24	32	40	48	-	-	-
V1117	8	16	24	32	40	48	-	-	-
V1118	8	16	24	32	40	48	56	-	-
V1119	8	16	24	32	40	48	56	-	-
V1120	8	16	24	32	40	48	56	64	-
V1121	8	16	24	32	40	48	56	64	-
V1122	8	16	24	32	40	48	56	64	72
V1123	8	16	24	32	40	48	56	64	72

\* RATINGS ARE GIVEN IN GALLONS PER MINUTE CONTINUOUS FLOW OF WATER HEATED FROM 40°F TO 140°F WITH 200°F BOILER WATER. PRESSURE DROP THROUGH EACH COIL IS 33 PSI AT 8 GPM.

FOR TANKLESS HEATER QUANTITIES LESS THAN MAXIMUM ALLOWABLE, IT IS IMPORTANT THAT WATER HEATERS BE CENTRALLY LOCATED IN BOILER. SEE FIGURE 8 FOR APPROPRIATE LOCATIONS.

3. Flushing of Heater

All water contains some sediment which settles on the inside of the coil. Consequently, the heater should be periodically backwashed. This is accomplished by installing hose bibs as illustrated

in Figure 32 and allowing water at city pressure to run into hose bib A, through the heater, and out hose bib B until the discharge is clear. The tees in which the hose bibs are located should be the same size as heater connections to minimize pressure drop.

4. **HARD WATER** - A water analysis is necessary to determine the hardness of your potable water. This is applicable to some city water and particularly to well water. An appropriate water softener should be installed based on the analysis and dealer's recommendation. This is not only beneficial to the tankless heater but to piping and fixtures plus the many other benefits derived from soft water.

#### M. STEAM BOILERS - INSTALL STEAM TRIM

Items for steam trim are located in the steam trim carton (except for the separately ordered low cutoff and tankless heater control). Figure 33 shows the proper tappings for each item.

1. Install the gauge glass set.
2. Install the low water cutoff. Follow manufacturers instructions furnished with control.
3. Install the Pressuretrol to the boiler using the 1/4" x 90° (1-7/8" x 4") siphon and the 3/4" NPT x 1/4" FPT hex bushing.
4. The Pressuretrol must be accurately leveled for proper operation. It is level when the leveling indicator hangs freely with its pointer directly over the index mark inside the back of the case. Level the controller by carefully bending the steam trap (siphon loop).

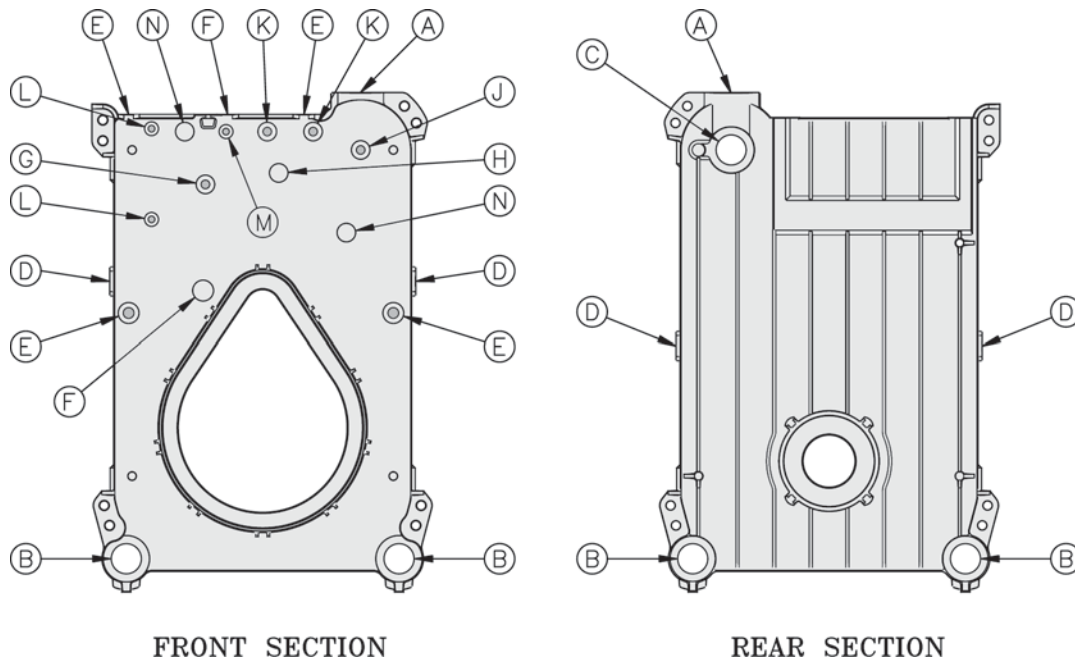


Figure 33 - Purpose of Tappings

## NOTICE

**The L404 Pressure Limit contains mercury in a sealed tube. Do *not* place limit in the trash at the end of its useful life. If this limit is replacing a limit that contains mercury in a sealed tube, do *not* place your old limit in the trash. Contact your local waste management authority for instructions regarding recycling and the proper disposal of this limit, or of an old limit containing mercury in a sealed tube. If you have questions, call Honeywell Inc. at 1-800-468-1502.**

5. Install the 3/4" drain cock using the 3" NPT x 3/4" FPT hex bushing.
6. Install the steam gauge using the 1/2" NPT x 1/4" FPT hex bushing.
7. Install the safety valve to the back section as shown in Figure 34. The safety valve is installed in the tee provided for blowoff piping.
8. For boilers with tankless heaters, install the operating control in an unused tapping through one of the heater plates.
9. Plug extra tappings.



TAPPING	SIZE	STEAM BOILER	WATER BOILER
(A)	4"	SUPPLY	SUPPLY
(B)	3"	RETURN	RETURN
(C)	3"	SAFETY VALVE	RELIEF VALVE
(D)	1-1/2"	CROWN INSPECTION/WASHOUT *	CROWN INSPECTION/WASHOUT *
(E)	1"	FLOAT L.W.C.O.	FLOAT L.W.C.O.
(F)	1"	AUXILIARY FLOAT L.W.C.O. *	-----
(G)	3/4"	PROBE L.W.C.O.	PROBE L.W.C.O.
(H)	3/4"	AUXILIARY PROBE L.W.C.O. *	-----
(J)	3/4"	PRESSURE LIMIT CONTROL	TEMPERATURE LIMIT CONTROL
(K)	3/4"	AUXILIARY PRES. LIMIT CONTROL	AUXILIARY TEMP. LIMIT CONTROL
(L)	1/2"	GAUGE GLASS	NOT USED - PLUG
(M)	1/2"	STEAM GAUGE (BUSH TO 1/4")	TEMPERATURE/PRESSURE GAUGE
(N)	3/4"	AUXILIARY TAPPING *	AUXILIARY TAPPING *

\* SPECIAL ORDER ONLY

## N. WATER BOILERS - INSTALL WATER TRIM

Items for water trim are located in the water trim carton (except for the separately ordered low water cutoff and tankless heater control). Figure 33 shows the proper tappings for each item.

1. Install the temperature pressure gauge.
2. Install the low water cutoff. Follow manufacturers instructions furnished with control.
3. Install the immersion well and mount the aquastat onto the well.
4. Install the 3/4" drain cock using the 3" NPT x 3/4" FPT hex bushing.
5. Install the pressure relief valve as shown in Figure 35.
6. Plug extra tappings.

## O. BURNER INSTALLATION

Refer to burner manufacturer's installation manual for proper installation, fuel piping, wiring, burner adjustment and service instructions.

- P. INSTALL ELECTRIC WIRING** in accordance with National Electric Code and local regulations. A separate ELECTRICAL CIRCUIT should be run from meter with a Fused Disconnect Switch in this Circuit.

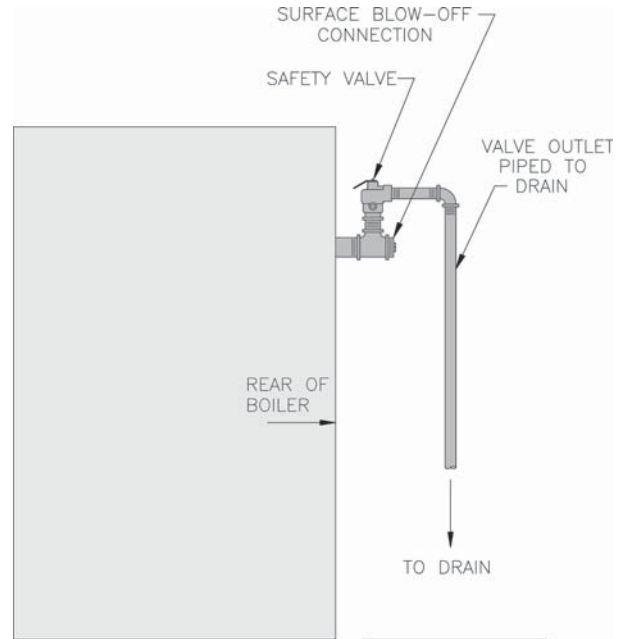


Figure 34: Steam Boiler - Safety Valve Hook-Up

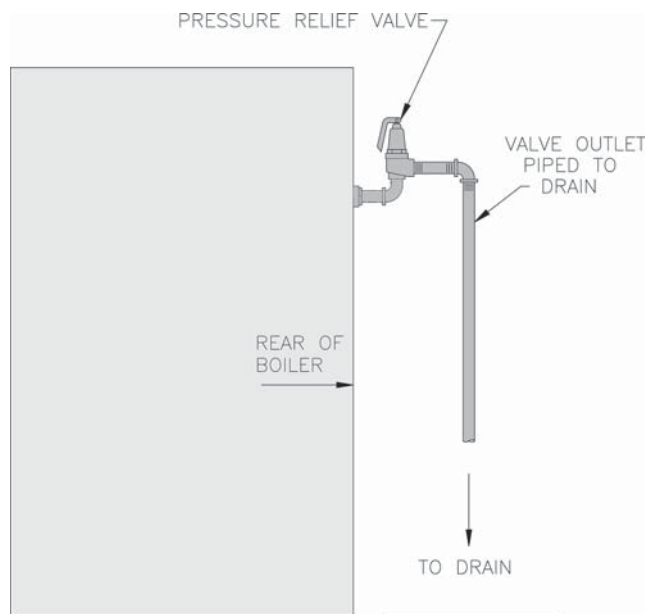


Figure 35: Water Boiler - Pressure Relief Valve Hook-Up

## SECTION IV - OPERATING INSTRUCTIONS

**A. ALWAYS INSPECT INSTALLATION BEFORE STARTING BURNER.**

**B. FILL HEATING SYSTEM WITH WATER.**

NOTE: It is important, especially in a steam system, to properly remove the oil and dirt from the system. Failure to clean the system can result in erratic water lines and surging.

CLEAN HEATING SYSTEM IF boiler water or condensate return water is dirty or if erratic water lines or surging exist after a few days of boiler operation. Refer to step (F) for proper cleaning instructions for steam and water boilers.

1. STEAM BOILERS - Fill boiler to normal water line. As shown in Figure 1, the normal water line is 45 $\frac{3}{4}$ " from the floor. At the start of each heating season and once or twice during the season try SAFETY VALVE to be sure it is in working condition. To do this, fasten wire or cord to lever of valve and pull lever — standing safe distance away from valve.
2. HOT WATER BOILERS - Fill entire Heating System with water and vent air from system. Use the following procedure on a Series Loop or Multi-zoned System to remove air from system when filling:
  - a. Close isolation valve in boiler supply piping.
  - b. Isolate all circuits by closing zone valves or balancing valves.
  - c. Attach a hose to bib cock located just below isolation valve in boiler supply piping.  
(Note - Terminate hose in five gallon bucket at a suitable floor drain or outdoor area).
  - d. Starting with one circuit, open zone valve.
  - e. Open bib cock.
  - f. Open fill valve (Make-up water line should be located directly above isolation valve in boiler supply piping).
  - g. Allow water to overflow from bucket until discharge from hose is bubble free for 30 seconds.
  - h. Open zone valve to the second zone to be purged, then close the first. Repeat this step until all zones have been purged, but always have one zone open. At completion, open all zone valves.
  - i. Close bib cock, continue filling the system until the pressure gauge registers normal system design operating pressure. Close fill valve.  
(Note - If make-up water line is equipped with pressure reducing valve, system will automatically fill to normal system design operating pressure. Leave globe valve open).

- j. Open isolation valve in boiler supply piping.
- k. Remove hose from bib cock.

### WARNING

ON A HOT WATER SYSTEM THE PRESSURE MUST NOT EXCEED 50 POUNDS UNLESS THE BOILER IS EQUIPPED ESPECIALLY FOR 80 LBS. MAXIMUM WORKING PRESSURE. IF BOILER PRESSURE EXCEEDS PRESSURE SETTING OF SAFETY RELIEF VALVE, IT MUST BE RELIEVED IMMEDIATELY AND THE CAUSE OF RELIEF VALVE FAILURE INVESTIGATED AND CORRECTED. EXCESS PRESSURE IS DANGEROUS, IN ADDITION, COULD CAUSE DAMAGE TO HEATING SYSTEM.

DO NOT draw water from boiler while in use. When adding water while boiler is in operation, do not open supply valve fully but add water slowly.

**C. SET CONTROLS** with burner service switch turned "OFF".

1. PRESS RESET BUTTON on primary control and release.
2. On STEAM BOILERS set cutout pressure (MAIN scale) on L404 Pressuretrol for five (5) PSI and differential pressure (DIFF scale) for two (2) PSI. These pressures may be varied to suit individual requirements of installation.
3. On STEAM BOILERS WITH TANKLESS DOMESTIC WATER HEATERS, set boiler water temperature dial on low limit operating control at 190°F (max.). Set differential at 10°.
4. ON WATER BOILERS WITHOUT TANKLESS HEATERS, set high limit dial on L4006A at 210°F. This temperature may be varied to suit requirements of installation.
5. ON WATER BOILERS WITH TANKLESS HEATERS, set low limit operating control dial at 190°F and high limit dial 210°F. Operating control must be a minimum of 20 below high limit setting. Set differential at 25°.

**D. ADJUST BURNER** according to the Burner Manual.

1. FLAME FAILURE

The V11 boiler controls operate the burner automatically. If for unknown reasons the burner ceases to fire and the reset button on the primary control is tripped, the burner has experienced ignition failure. Before pressing the reset button, call your serviceman immediately.

## CAUTION

Do not attempt to start the burner when excess oil or gas has accumulated in the combustion chamber, when the unit is full of vapor, or when the combustion chamber is very hot.

### E. TEST CONTROLS

## WARNING

Before Installation of the boiler is considered complete the operation of the boiler controls should be checked, particularly the low water cutoff and the high limit control.

#### 1. CHECK OPERATING CONTROL OPERATION.

Raise and lower operating control setting as required to start and stop burner.

#### 2. CHECK OPERATION OF HIGH LIMIT CONTROL —

Jumper Operating Control Terminals. Allow burner to operate until shutdown by limit. Installation is not considered complete until this check has been made. REMOVE JUMPER.

#### 3. CHECK LOW WATER CUTOFF control with water level at normal water line (see Figure 1). Raise operating control setting to allow burner to operate. Open boiler drain to allow water level to drop to bottom of sight glass until burner operation is shut down by low water cutoff.

Close boiler drain and refill to normal water line. Burner should automatically restart during fill. Reset operating control.

## IMPORTANT

PROBE AND FLOAT TYPE LOW WATER CUTOFF DEVICES REQUIRE ANNUAL INSPECTION AND MAINTENANCE. Refer to Section V, step (D) on Page 35 for proper cleaning instructions.

#### 4. CHECK OPERATING CONTROL on boiler equipped with tankless heaters. With burner off, draw hot water until burner starts, then turn off hot water and check burner shutdown.

### F. BOILER AND SYSTEM CLEANING INSTRUCTIONS FOR TROUBLE FREE OPERATION.

## NOTICE

A QUALIFIED WATER TREATMENT CHEMICAL SPECIALIST SHOULD BE CONSULTED FOR RECOMMENDATIONS REGARDING APPROPRIATE CHEMICAL

COMPOUNDS AND CONCENTRATIONS WHICH ARE COMPATIBLE WITH LOCAL ENVIRONMENTAL REGULATIONS.

#### 1. STEAM BOILERS

- a. Oil, greases & sediments which accumulate in a new boiler and piping must be removed in order to prevent an unsteady water line and carry over of the water into the supply main above boiler. Operate the boiler with steam in the entire system for a few days allowing the condensate to return to the boiler. If the condensate can temporarily be wasted, operate boiler only for the length of time it takes for condensate to run clear. If the latter cannot be achieved or if the condensate is returned to the boiler, boil out the boiler using the SURFACE BLOWOFF connection. See Figure 34.
  - i. Drain boiler until water is just visible in gauge glass. Run temporarily 1½" pipe line from the surface blowoff connection to an open drain or some other location where hot water may be discharged safely. Do not install valve in this line.
  - ii. Add an appropriate amount of recommended boilout compounds.
  - iii. Start burner and operate sufficiently to boil the water without producing steam pressure. Boil for about 5 hours. Open boiler feed pipe sufficiently to permit a steady trickle of water from the surface blowoff pipe. Continue this slow boiling and trickle of overflow for several hours until the water coming from the overflow is clear.
  - iv. Stop burner and drain boiler in a manner and to a location that hot water can be discharged with safety.
  - v. Refill boiler to normal water line. If water in gauge glass does not appear to be clear, repeat steps (i. thru v.), and boil out the boiler for a longer time.
- b. Low pressure steam boilers such as the V11 Series should be maintained with appropriate water treatment compounds. Add water treatment compounds as recommended by your local qualified water treatment company.
- c. Remove temporary surface blowoff piping, plug tapping and reinstall safety valve. Boil or bring water temperature to 180°F promptly in order to drive off the dissolved gases in the fresh water.
- d. If unsteady water line, foaming or priming persist, install gate valve in Hartford Loop and drain valves in return main and at boiler and proceed as follows:
  - i. Connect hoses from drain cocks to floor drain. Close gate valve in Hartford Loop and open drain cock in return main. Fill



boiler to normal water level, turn on burner and operate boiler at this water level for at least 30 minutes after the condensate begins to run hot, then turn off burner.

Close all radiator valves. Remove all supply main air valves and plug the openings in supply main.

- ii.* Draw about 5 gallons of hot water from boiler into a container and dissolve into it appropriate amount of a recommended boilout compound. Remove safety valve and pour this solution into boiler, then reinstall safety valve.
  - iii.* Turn on burner and keep operating while feeding water to boiler slowly. This will raise water level in boiler slowly so that water will be boiling hot and will rise slowly into supply main and back through return main, flowing from drain hose at about 180°F. Continue until water runs clear from drain hose for at least 30 minutes.
  - iv.* Stop feeding water to boiler but continue operating burner until excess water in boiler flows out through supply main and water lowers (by steaming) until it reaches normal level in boiler. Turn off burner. Drain boiler. Open all radiator valves. Reinstall all supply main air valves. Open gate valve in Hartford Loop.
  - v.* When boiler has cooled down sufficiently (crown sheet of sections are not too hot to touch), close the drain cocks at boiler and in return main and feed water slowly up to normal level in boiler. Turn on burner and allow boiler to steam for 10 minutes then turn off burner. Draw off one quart of water from bottom gauge glass fitting and discard. Draw off another quart sample and if this sample is not clear, repeat the cycle of draining the boiler and return main and refilling the boiler until sample is clear.
  - vi.* If the boiler water becomes dirty again at a later date due to additional sediment loosened up in the piping, close gate valve in Hartford Loop, open drain cock in return main, turn on burner and allow condensate to flow to drain until it has run clear for at least 30 minutes while feeding water to boiler so as to maintain normal water level. Turn off burner, drain boiler, open gate valve in Hartford Loop, then repeat step (a) above.
- e.* Make pH or Alkalinity Test.

After boiler and system have been cleaned and refilled as previously described, test the pH of the water in the system. This can easily be done

by drawing a small sample of boiler water and testing hydrion paper which is used in the same manner as litmus paper, except it gives specific readings. A color chart on the side of the small hydrion dispenser gives the reading in pH. Hydrion paper is inexpensive and obtainable from any chemical supply house or through your local druggist. The pH should be higher than 7, but lower than 11. Add some appropriate water treatment chemicals, if necessary to bring the pH within the specified range.

- f.* Boiler is now ready to be put into service.

## 2. WATER BOILERS

- a.* Filling of Boiler and System --- General --- In a hot water heating system, the boiler and entire system (other than the expansion tank) must be full of water for satisfactory operation. Water should be added to the system until the boiler pressure gauge registers normal system design operating pressure. To insure that the system is full, water should come out of all air vents when opened.
- b.* Boiling Out of Boiler and System. The oil and grease which accumulate in a new hot water boiler can be washed out in the following manner.
  - i.* Remove safety relief valve using extreme care to avoid damaging it.
  - ii.* Add an appropriate amount of recommended boilout compound.
  - iii.* Reinstall safety relief valve.
  - iv.* Fill the entire system with water.
  - v.* Start firing the boiler.
  - vi.* Circulate the water through the entire system.
  - vii.* Vent the system, including the radiation.
  - viii.* Allow boiler water to reach operating temperature, if possible.
  - ix.* Continue to circulate the water for a few hours.
  - x.* Stop firing the boiler.
  - xi.* Drain the system in a manner and to a location that hot water can be discharged with safety.
  - xii.* Remove plugs from all available returns and wash the water side of the boiler as thoroughly as possible, using a high-pressure water stream.
  - xiii.* Refill the system with fresh water.

c. Add appropriate boiler water treatment compounds as recommended by your local qualified water treatment company.

d. Make pH or Alkalinity Test.

After boiler and system have been cleaned and refilled as previously described, test the pH of the water in the system. This can easily be done by drawing a small sample of boiler water and testing with hydrion paper which is used in the same manner as litmus paper, except it gives specific readings. A color chart on the side of the small hydrion dispenser gives the reading in pH. Hydrion paper is inexpensive and obtainable from any chemical supply house or thru your local druggist. The pH should be higher than 7 but lower than 11. Add some appropriate water treatment chemicals, if necessary to bring the pH within the specified range. With this lower level of protection, care must be exercised to eliminate all of the free oxygen in the system.

e. Boiler is now ready to be put into service.

## G. IMPORTANT

If, during normal operation, it is necessary to add water to this boiler more frequently than once a month consult a qualified service technician to check your system for leaks. A leaky system will increase the volume of make-up water supplied to the boiler which can significantly shorten the life of the boiler. Entrained in make-up water are dissolved minerals and oxygen. When the fresh, cool make-up water is heated in the boiler the minerals fall out as sediment and the oxygen escapes as a gas. Both can result in reduced boiler life. The accumulation of sediment can eventually isolate the water from contacting the cast iron. When this happens the cast iron in that area gets extremely hot and eventually cracks. The presence of free oxygen in the boiler creates a corrosive atmosphere which, if the concentration becomes high enough, can corrode the cast iron through from the inside. Since neither of these failure types are the result of a casting defect the warranty does not apply. Clearly it is in everyone's best interest to prevent this type of failure. The maintenance of system integrity is the best method to achieve this.

## SECTION V - SERVICE INSTRUCTIONS

- A. IMPORTANT** - See Section IV, Item (G), on page 34, under Operating Instructions if it becomes necessary to add water to the boiler more frequently than once a month.
- B. GENERAL** - Inspection should be conducted annually. Service as frequently as specified in paragraphs below. While service or maintenance is being done, electrical power to the boiler must be "off".
- C. CLEAN THE BOILER HEATING SURFACES AND FLUE** at least once each year, preferably at the end of the heating season.
1. **CLEAN THE VENT SYSTEM** - Vent system should be checked annually for:
    - a. Obstructions.
    - b. Accumulations of soot.
    - c. Deterioration of vent pipe or vent accessories due to condensation or other reasons.
    - d. Proper support - no sags, particularly in horizontal runs.
    - e. Tightness of joints.Remove all accumulations of soot with wire brush and vacuum. Remove all obstructions. Replace all deteriorated parts and support properly. Seal all joints.
  2. **CLEAN THE BOILER FLUEWAYS**
    - a. Remove the smokepipe.
    - b. Remove the jacket top and left side panels.
    - c. Remove the canopy being careful not to damage the cerafelt gasket.
    - d. Loosen nuts securing the flue cleanout plates and remove the plates. The insulation should be removed with the plates taking care not to damage the insulation.
    - e. Using a 1/4" diameter wire or fibre bristle brush (36" handle) to clean the flueways. Start at the top of each flueway opening and work down the pin rows using two or three horizontal strokes per row for best results.
  3. **CLEAN TOP OF BOILER SECTIONS.**  
Brush and vacuum the tops of the boiler sections.
  4. **CLEAN THE FIREBOX**
    - a. Disconnect fuel line(s) and remove burner and burner mounting plate.
    - b. Using wire or fibre bristle brush clean crown of boiler and inside of water legs.
    - c. Inspect firewall plates for damage or deterioration. Replace as needed per instructions outlined in Section III, Step (E) on Page 18.
  5. **REASSEMBLE BOILER**
    - a. Install the canopy taking care to align the cerafelt strips. If strips are damaged replace as needed.
    - b. Reinstall burner mounting plate to front section making sure 3/16" diameter rope gasket is in place and forms gas tight seal. If gasket is damaged, replace.
    - c. Bolt burner to burner mounting plate. Inspect gasket to assure adequate seal. Replace if damaged. Connect oil line(s) and/or gas line(s).
    - d. Reinstall flue plates making sure gasket on each plate is in place and forms gas tight seal. If damaged, all edges of the cleanout plates should be sealed with Silastic sealant when reinstalled until insulation can be replaced.
    - e. Reinstall jacket top and left side panels.
    - f. Reinstall smokepipe.
- D. MAINTENANCE OF LOW WATER CUTOFF DEVICES**

### IMPORTANT

PROBE AND FLOAT TYPE LOW WATER CUTOFF DEVICES REQUIRE ANNUAL INSPECTION AND MAINTENANCE.

1. **PROBE TYPE LOW WATER CUTOFF**  
Although these devices are solid state in their operation, the probe is exposed to possible contamination in the boiler water and subject to fouling.  
It is important to physically remove the probe from the boiler tapping annually and inspect that probe for accumulation of scale or sediment.  
Follow these steps to inspect, clean and /or replace the probe:
  - a. Turn off electric service to the boiler.
  - b. Drain boiler water to a level below the tapping for the probe.
  - c. Disconnect wiring connections between the low water cutoff control and the probe.
  - d. Dismount the low water cutoff control from the probe.

### DANGER

**Assure that the boiler is at zero pressure before removing the LWCO probe. Do not rely on the pressure gauge to indicate that the boiler is at zero pressure. Open the safety valve to relieve all internal pressure prior to proceeding. Safety valve discharge piping must be piped such that the potential for burns is eliminated.**

- e. Unscrew the probe from the boiler tapping.
- f. Inspect that portion of the probe that is exposed to the boiler water for a scale or sediment buildup.

- g. Light deposits may be removed by wiping the probe with a damp cloth. Wiping the probe with a cloth soaked in vinegar will remove more tenacious lime deposits. The most stubborn deposits may be removed from the probe by using a diluted amount (3 part of water to 1 part) of phosphoric acid (H<sub>2</sub>PO<sub>4</sub>).

## CAUTION

Exercise caution when handling phosphoric acid and follow the instruction label on its container.

- h. Wire brushing of the probe is not recommended as the soft platinum guard ring sandwiched between the ceramic insulators may be damaged. Care must be taken not to damage this ring in any way or the useful life of the probe may be shortened.
- i. Clean the pipe threads of the probe to remove old, hardened pipe dope and other foreign matter.
- j. Apply a moderate amount of good quality pipe dope to the pipe threads on the probe, leaving the two end threads bare. Do not use PTFE (Teflon) tape.
- k. Screw the probe into the boiler tapping.
- l. Mount the low water cutoff control on the probe.
- m. Reconnect the control to probe wiring.
- n. Fill the boiler to its normal waterline.
- o. Add boiler water treatment compound as needed.
- p. Restore electric service to the boiler.
- q. Fire burner to bring the water in the boiler to a boil to drive off free oxygen.
- r. **WARNING - BEFORE RETURNING BOILER TO SERVICE:** Follow the low water cutoff check out procedure on page 32.

## 2. FLOAT TYPE LOW WATER CUTOFF

During the heating season, if an external low water cutoff is on the boiler, the blow off valve should be opened once a month (use greater frequency where conditions warrant), to flush out the sediment chamber so the device will be free to function properly.

Low water cutoffs and water feeders should be dismantled annually by qualified personnel, to the extent necessary to insure freedom from obstructions and proper functioning of the working parts. Inspect connecting lines to boiler for accumulation of mud, scale, etc., and clean as required. Examine all visible wiring for brittle or worn insulation and make sure electrical contacts are clean and that they function properly. Give special attention to solder joints on bellows and float when this type of control is used. Check float for evidence of collapse and check mercury bulb (where applicable) for mercury separation or discoloration. **DO NOT ATTEMPT TO REPAIR MECHANISMS IN THE FIELD.** Complete replacement mechanisms, including necessary gaskets and installation instructions, are

available from the manufacturer.

- E. Check burner and controls at least once a year. See Section IV, Step (E) under Operating Instructions for control checks. See Burner Manual for burner tests and adjustments.
- F. **LUBRICATE BOILER COMPONENTS** according to manufacturer's instructions. Generally, this involves the oil burner and circulator. This includes the type of lubricant to use, frequency of lubrication, and points to lubricate.
- G. **GENERAL MAINTENANCE CONSIDERATIONS**
  1. Keep radiators and convectors clean.
  2. If a hot water radiator is hot at the bottom but not at the top, it indicates that air has accumulated inside and should be vented. To vent radiator, hold small cup under air vent (located near top of radiator), open vent until water escapes and then close.
  3. If much water is added to system, it is advisable to heat system to a high temperature and vent again. This will make less venting necessary during the winter.
  4. Where an expansion tank is used, make sure that neither the tank nor its drain pipe is exposed to freezing temperatures. Never place valves in piping leading to or from expansion tank.
  5. Boiler and system cleaning will help assure trouble free operation. See Section IV, Step (F) under Operating Instructions for procedure.
- H. **ATTENTION TO BOILER WHILE NOT IN OPERATION**

## IMPORTANT

**IF BOILER IS NOT USED DURING WINTER TIME, IT MUST BE FULLY DRAINED TO PREVENT FREEZE DAMAGE.**

1. Spray inside surfaces with light lubricating or crankcase oil using gun with extended stem so as to reach all corners.
2. With steam boilers, at end of season add sufficient water to fill boiler to top of water column and leave it that way until fall when water should be drained again to proper level. If at this time boiler water is dirty, drain water, flush out boiler, and refill with clean water to prescribed water level.
3. Always keep the manual fuel supply valve shut off if the burner is shut down for an extended period of time.
4. To recondition the heating system in the fall season after a prolonged shut down, follow the instructions outlined in Section IV - Operating Instructions, Steps (B) through (E).



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## SECTION VI - REPAIR PARTS

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All V11 Series repair parts may be obtained through your local Burnham Wholesale Distributor. Should you require assistance in locating a Burnham Distributor in your area, or have questions regarding the availability of Burnham products or repair parts, please contact Burnham Customer Service at (717) 481-8400 or Fax (717) 481-8408.



**REPAIR PARTS FOR BARE BOILER ASSEMBLY**

ITEM NO.	DESCRIPTION	BOILER SECTIONS / QUANTITY																				PART NO.																					
		04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23																						
1	Front Section	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7172603																						
2	"C" Center Section - Steam Boiler	2	3	4	5	6	7	7	8	9	10	10	11	12	13	13	14	15	16	16	17	7172605																					
	Water Boiler	2	3	4	5	6	7	8	9	10	11	12	13	13	14	15	16	17	18	19	20	7172605																					
3	Optional - "CT" Center Section w/Tankless Heater Opening- Max. No. of Heaters - ("CT" Replaces "C" Center Section)	1	2	2	3	3	4	4	4	5	5	5	6	6	6	7	7	8	8	9	9	7172607																					
4	"CX" Center Section with 4" Supply Tapping - Steam Boiler								1	1	1	1	2	2	2	3	3	3	3	4	4	7172606																					
	Water Boiler													1	1	1	1	1	1	1	1	7172606																					
5	Back Section	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7172604																					
6	Target Wall (V-1104 thru 1106 only)	1	1	1																		6202601																					
	Silastic, 450°F, 10 oz. Tube	2	2	3	4	5	5	6	7	8	8	9	10	11	11	12	13	14	14	15	16	9056009																					
7	7" Cast Iron Slip Nipple	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	706600																					
8	3" Cast Iron Slip Nipple	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	7066002																					
	Nipple Gauge, 3" & 7"	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	80660023																					
	Nipple Lubricant, Loctite® #592, 50 ml	2	2	3	3					1	1	2	2	3	3					1	1	8056254																					
	250 ml					1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	8056255																					
9	3/4" -10 x 11" Lg. Tie Rod	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84	88	80861092																					
10	"Front" Firewall Plate	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8202603																					
11	"Common" Firewall Plate			1	1	2	2	3	3	4	4	5	5	5	5	5	5	5	5	5	5	8202604																					
12	Formed Steel Flue Cover Plate	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	6112601																					
13	Flue Cover "J" Bolt, 5/16" - 18 x 2-3/4 Lg.	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	80861680																					
14	Tankless Heater/Cover Plate Gasket	(One Required for each "CT" Section)																				8032601																					
15A	V11-2 Tankless Heater Assembly	(One Required for each "CT" Section)																				6032601																					
	- OR -																																										
15B	Blank Heater Cover Plate Only	(One Required for each "CT" Section)																				6032602																					
16	Rear Observation Port Cover (Incls. gasket & mounting hdwe)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	609600011																					
17	Canopy Assemblies:																																										
	<u>One Piece Canopy</u>																																										
17A	Canopy Assembly, V1104	1																				6112604																					
17B	Canopy Assembly, V1105		1																				6112605																				
17C	Canopy Assembly, V1106			1																				6112606																			
17D	Canopy Assembly, V1107				1																				6112607																		
17E	Canopy Assembly, V1108					1																				6112608																	
17F	Canopy Assembly, V1109						1																				6112609																
17G	Canopy Assembly, V1110							1																				6112610															
17H	Canopy Assembly, V1111								1																				6112611														
17 I	Canopy Assembly, V1112									1																				6112612													
	<u>Two Piece Canopy</u>																																										
17J	Canopy Front Portion Assembly, V1113													1																	6112624												
17K	Canopy Front Portion Assembly, V1114/V1117														1	1	1	1														6112625											
17L	Canopy Front Portion Assembly, V1118/V1121																		1	1	1	1	6112626																				
17M	Canopy Front Portion Assembly, V1122/V1123																					1	1	6112620																			
17N	Canopy Back Portion Assembly, V1113													1																	6112613												
17O	Canopy Back Portion Assembly, V1114														1																	6112614											
17P	Canopy Back Portion Assembly, V1115															1																	6112615										
17Q	Canopy Back Portion Assembly, V1116																1																	6112616									
17R	Canopy Back Portion Assembly, V1117																		1																	6112617							
17S	Canopy Back Portion Assembly, V1118																				1																	6112618					
17T	Canopy Back Portion Assembly, V1119																					1																	6112619				
17U	Canopy Back Portion Assembly, V1120																						1																	6112620			
17V	Canopy Back Portion Assembly, V1121																							1																	6112621		
17W	Canopy Back Portion Assembly, V1122																								1																	6112622	
17X	Canopy Back Portion Assembly, V1123																									1																	6112623
18	Cerafelt Gasket (1/2" x 2" Wide x L.F.)	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	9206003																					
19	Canopy Mounting Bracket	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	71129002																				

**REPAIR PARTS FOR BARE BOILER ASSEMBLY (cont'd)**

ITEM NO.	DESCRIPTION	BOILER SECTIONS / QUANTITY																							PART NO.
		04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
20	Canopy 'J' Bolt, 5/16 - 18 x 7-3/4 Lg.	2	2	2	2	4	4	6	6	8	8	10	10	12	12	14	14	16	16	18	18	80861679			
21	Adhesive Fiber Gasket, 1/8" x 1" Wide x L.F.	12	12	12	12	12	12	13	13	13	17	17	17	17	17	18	18	18	18	19	19	9206032			
22	Top Flue Outlet Assembly, 8" Collar	1	1	1																		6112627			
	10"				1	1	1															6112628			
	12"							1	1	1	1											6112629			
	14"										1	1	1	1								6112630			
	16"														1	1	1	1				6112631			
	18"																			1	1	6112637			
22A	Top Outlet Canopy Cover, 8" Opening	1	1	1																		7112638			
	10"				1	1	1															7112639			
	12"							1	1	1	1											7112640			
	14"										1	1	1	1								7112641			
	16"														1	1	1	1				7112642			
	18"																			1	1	71126420			
	- OR -																								
23	Rear Flue Outlet Assembly, 8" Collar	1	1	1																		6112632			
	10"				1	1	1															6112633			
	12"							1	1	1	1											6112634			
	14"										1	1	1	1								6112635			
	16"														1	1	1	1				6112636			
	18"																			1	1	6112638			
23A	Rear Flue Outlet Cover	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7112632			
24	3/16" Dia. Rope Gasket x L.F.	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	72026021			
25	5/16 - 18 x 2" Lg. Tap-end Stud	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	80861606			
26A	Standard Burner Mounting Plate Assembly (Above Assembly Includes Items 27A, 28 and 29)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6022601			
	- OR -																								
26B	Gordon-Piatt Burner Mounting Plate Assembly Above Assembly Includes Items 27B, 28 and 29)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6022602			
27A	Standard C.I. Burner Mounting Plate (Machined)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7172601			
	- OR -																								
27B	Gordon-Piatt C.I. Burner Mounting Plate (Machined)	1	1	1	1	1	1	1	1	1										1	1	7172602			
28	Shutter Door Assembly Parts:																								
28A.	Handle Knob	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8026036			
28B.	Shutter Handle	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8026033			
28C.	Shutter Spring	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8026034			
28D.	Observation Port Shutter (Machined & Painted)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	70260051			
28E.	Spring Pin	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8026035			
29	Observation Port Assembly Parts:																								
29A.	Observation Port Cover (Machined & Painted)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	70260041			
29B.	Observation Port Outer Gasket	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8206001			
29C.	Observation Port Glass	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8026032			
29D.	Observation Port Inner Gasket	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8206002			
30A	Standard Burner Mounting Plate Insulation	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8202601			
	- OR -																								
30B	Gordon-Piatt Burner Mounting Plate Insulation	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8202602			
31	Burner Adapter Plate Assembly w/Gasket and Hardware:																								
31A	Beckett ("CF") BAP No. "00", 6-3/4" Dia. Hole	1	1	1	1	1	1				1	1										602263001			
31B	Beckett ("CF") BAP No. "01", 8-1/4" Dia. Hole							1	1			1	1									602263011			
31C	Beckett ("CF") BAP No. "02", 10-1/4" Dia. Hole														1							602263021			
	- OR -																								
31D	Power Flame ("C") BAP No. "40", 7-1/2" Dia. Hole	1	1																			602263401			
31E	Power Flame ("C") BAP No. "41", 9" Dia. Hole			1	1	1	1	1														602263411			
31F	Power Flame ("C") BAP No. "42", 10-3/8" Dia. Hole									1	1	1	1	1	1	1	1	1	1	1	1	602263421			
	- OR -																								
31G	Power Flame ("JR") BAP No. "45", 6-3/8" Dia. Hole	1	1																			602263451			
31H	Power Flame ("JR") BAP No. "46", 8-3/8" Dia. Hole			1	1	1																602263461			
32	Burner Adapter Plate Gasket only	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8022601			



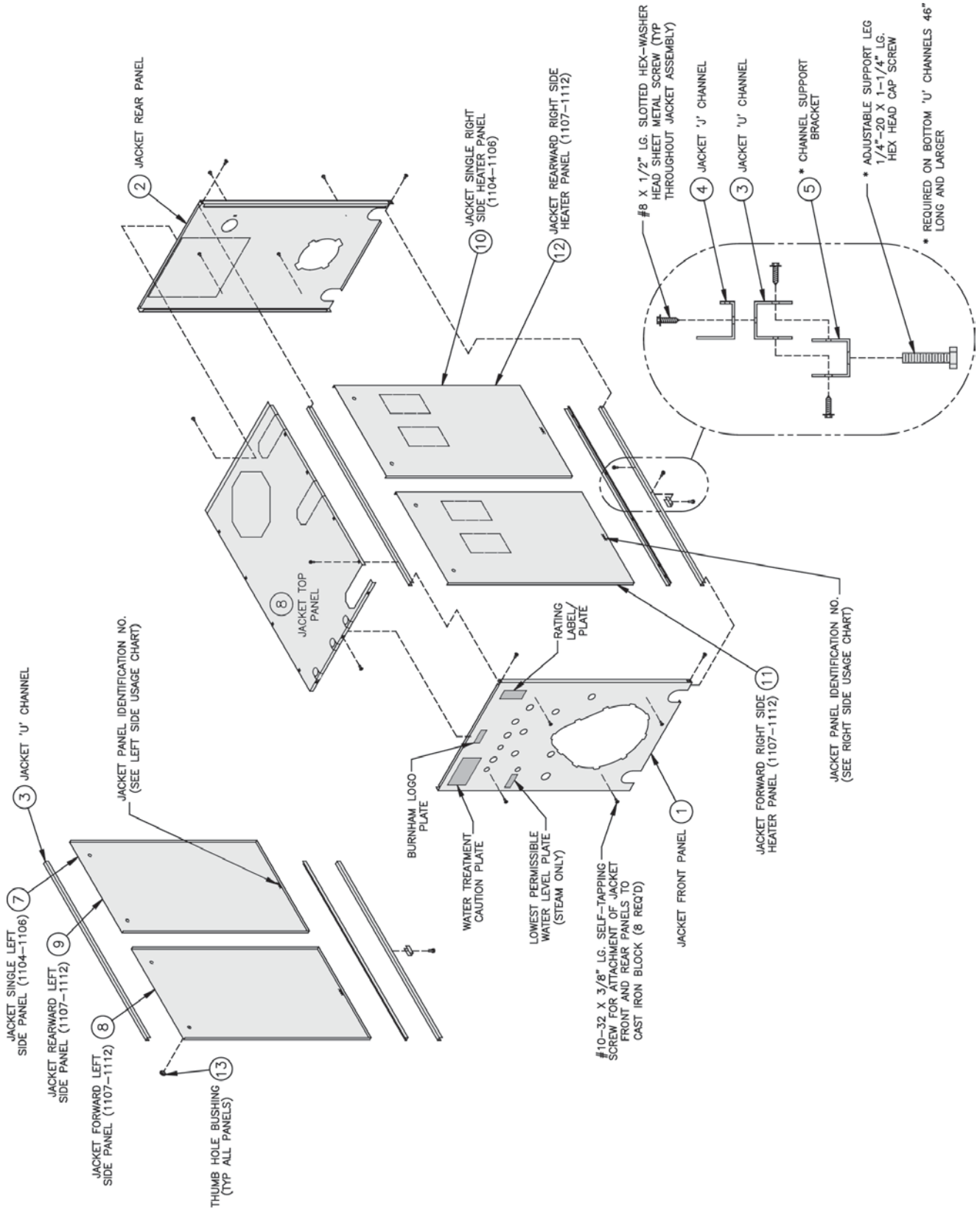


Figure 37: V11 Series Jacket Assembly (Boiler Models V1104 Thru V1112)

## JACKET REPAIR PARTS (Models V1104 Thru 1112)

ITEM NO.	DESCRIPTION	V1104	V1105	V1106	V1107	V1108	V1109	V1110	V1111	V1112	PART NO.
1	Jacket Front Panel Assembly	1	1	1	1	1	1	1	1	1	60426001
2	Jacket Rear Panel Assembly	1	1	1	1	1	1	1	1	1	60426002
3	Jacket 'U' Channels:										
3A	'U' Channel No. U26	4									6042665
3B	'U' Channel No. U32		4								6042666
3C	'U' Channel No. U38			4							6042668
3D	'U' Channel No. U44				4						6042670
3E	'U' Channel No. U50					4					6042672
3F	'U' Channel No. U56						4				6042674
3G	'U' Channel No. U63							4			6042676
3H	'U' Channel No. U69								4		6042678
3 I	'U' Channel No. U75									4	6042680
4	Jacket 'J' Channels:										
4A	'J' Channel No. J26	2									6042648
4B	'J' Channel No. J32		2								6042649
4C	'J' Channel No. J38			2							6042651
4D	'J' Channel No. J44				2						6042653
4E	'J' Channel No. J50					2					6042655
4F	'J' Channel No. J56						2				6042657
4G	'J' Channel No. J63							2			6042659
4H	'J' Channel No. J69								2		6042661
4 I	'J' Channel No. J75									2	6042663
5	Jacket Channel Support Bracket (Required on Bottom 'U' Channels 46" Lg. and Larger)					1	1	1	1	1	60426004
6	Jacket Top Panel Assemblies:										
6A	Jacket Top Panel Assembly, V1104	1									60426040
6B	Jacket Top Panel Assembly, V1105		1								60426050
6C	Jacket Top Panel Assembly, V1106			1							60426060
6D	Jacket Top Panel Assembly, V1107				1						60426070
6E	Jacket Top Panel Assembly, V1108					1					60426080
6F	Jacket Top Panel Assembly, V1109						1				60426090
6G	Jacket Top Panel Assembly, V1110							1			60426100
6H	Jacket Top Panel Assembly, V1111								1		60426110
6 I	Jacket Top Panel Assembly, V1112									1	60426120
7	Jacket Single Left Side Panel Assemblies:										
7A	Single L.S. Pnl. Assy., No. SLS24	1									60426043
7B	Single L.S. Pnl. Assy., No. SLS30		1								60426053
7C	Single L.S. Pnl. Assy., No. SLS36			1							60426063
8	Jacket Forward Left Side Panel Assemblies:										
8A	Forward L.S. Pnl. Assy., No. FLS27				1	1	1	1			6042636
8B	Forward L.S. Pnl. Assy., No. FLS39								1	1	6042637
9	Jacket Rearward Left Side Panel Assemblies:										
9A	Rearward L.S. Pnl. Assy., No. RLS15				1						6042641
9B	Rearward L.S. Pnl. Assy., No. RLS21					1					6042642
9C	Rearward L.S. Pnl. Assy., No. RLS27						1		1		6042643
9D	Rearward L.S. Pnl. Assy., No. RLS33							1		1	6042644
10	Jacket Single Right Side Heater Panel Assemblies:										
10A	Single R.S. Htr. Pnl. Assy., No. SRH24	1									60426042
10B	Single R.S. Htr. Pnl. Assy., No. SRH30		1								60426052
10C	Single R.S. Htr. Pnl. Assy., No. SRH36			1							60426062
11	Jacket Forward Right Side Heater Panel Assemblies:										
11A	Forward R.S. Htr. Pnl. Assy., No. FRH27				1	1	1	1			6042624
11B	Forward R.S. Htr. Pnl. Assy., No. FRH39								1	1	6042625
12	Jacket Rearward Right Side Heater Panel Assemblies:										
12A	Rearward R.S. Htr. Pnl. Assy., No. RRH15				1						6042629
12B	Rearward R.S. Htr. Pnl. Assy., No. RRH21					1					6042630
12C	Rearward R.S. Htr. Pnl. Assy., No. RRH27						1		1		6042631
12D	Rearward R.S. Htr. Pnl. Assy., No. RRH33							1		1	6042632
13	Thumb Hole Bushing, Heyco SB-1093-15, #2166 Black	4	4	4	6	8	8	8	8	8	8136257

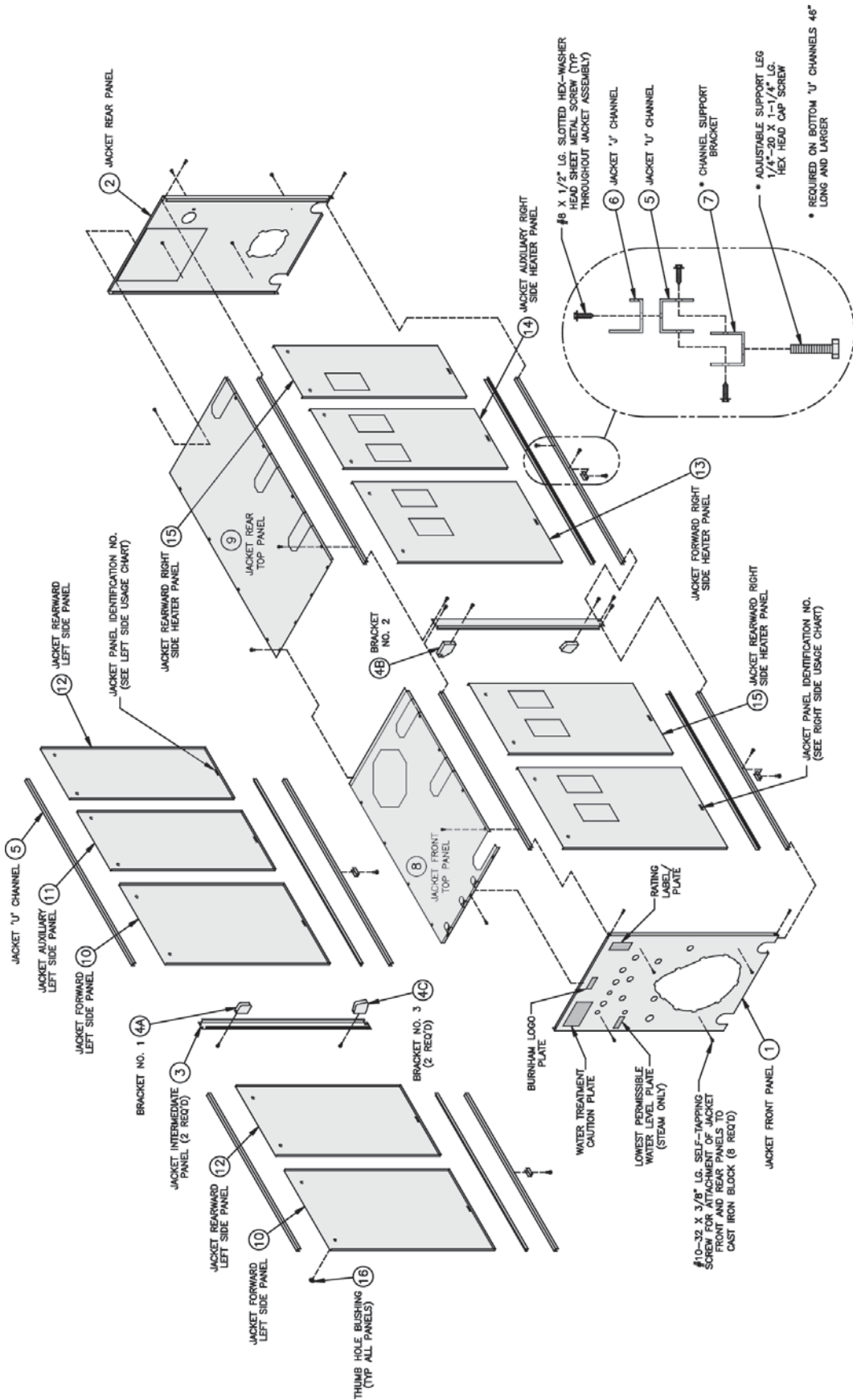


Figure 38: V11 Series Jacket Assembly (Boiler Models V1113 Thru V1123)

## JACKET REPAIR PARTS (Models V1113 Thru 1123)

ITEM NO.	DESCRIPTION	V1113	V1114	V1115	V1116	V1117	V1118	V1119	V1120	V1121	V1122	V1123	PART NO.
1	Jacket Front Panel Assembly	1	1	1	1	1	1	1	1	1	1	1	60426001
2	Jacket Rear Panel Assembly	1	1	1	1	1	1	1	1	1	1	1	60426002
3	Jacket Intermediate Panel Assembly	2	2	2	2	2	2	2	2	2	2	2	60426003
4	Jacket Intermediate Panel Mounting Brackets:												
4A	Bracket No. 1	1	1	1	1	1	1	1	1	1	1	1	6042601
4B	Bracket No. 2	1	1	1	1	1	1	1	1	1	1	1	6042602
4C	Bracket No. 3	2	2	2	2	2	2	2	2	2	2	2	6042603
5	Jacket 'U' Channels:												
5A	'U' Channel No. U34	4											6042667
5B	'U' Channel No. U40		4										6042669
5C	'U' Channel No. U46	4	4	8	4								6042671
5D	'U' Channel No. U52				4	8	4	4					6042673
5E	'U' Channel No. U58						4		4				6042675
5F	'U' Channel No. U65							4	4	8	4	4	6042677
5G	'U' Channel No. U71										4		6042679
5H	'U' Channel No. U77											4	6042681
6	Jacket 'J' Channels:												
6A	'J' Channel No. J34	2											6042650
6B	'J' Channel No. J40		2										6042652
6C	'J' Channel No. J46	2	2	4	2								6042654
6D	'J' Channel No. J52				2	4	2	2					6042656
6E	'J' Channel No. J58						2		2				6042658
6F	'J' Channel No. J65							2	2	4	2	2	6042660
6G	'J' Channel No. J71										2		6042662
6H	'J' Channel No. J77											2	6042664
7	Jacket Channel Support Bracket (Required on Bottom 'U' Channels 46" Lg. and Larger)	2	2	4	4	4	4	4	4	4	4	4	60426004
8	Jacket Front Top Panel Assemblies:												
8A	Jacket Front Top Panel Assy., V1113	1											60426130
8B	Jacket Front Top Panel Assy., V1114/15		1	1									60426140
8C	Jacket Front Top Panel Assy., V1116/17				1	1							60426160
8D	Jacket Front Top Panel Assy., V1118						1						60426180
8E	Jacket Front Top Panel Assy., V1119/21							1	1	1			60426190
8F	Jacket Front Top Panel Assy., V1122/23										1	1	60426200
9	Jacket Rear Top Panel Assemblies:												
9A	Jacket Rear Top Panel Assy., V1113	1											60426134
9B	Jacket Rear Top Panel Assy., V1114		1										60426144
9C	Jacket Rear Top Panel Assy., V1115			1									60426154
9D	Jacket Rear Top Panel Assy., V1116				1								60426164
9E	Jacket Rear Top Panel Assy., V1117					1							60426174
9F	Jacket Rear Top Panel Assy., V1118						1						60426184
9G	Jacket Rear Top Panel Assy., V1119							1					60426194
9H	Jacket Rear Top Panel Assy., V1120								1				60426204
9I	Jacket Rear Top Panel Assy., V1121									1			60426214
9J	Jacket Rear Top Panel Assy., V1122										1		60426224
9K	Jacket Rear Top Panel Assy., V1123											1	60426234
10	Jacket Forward Left Side Panel Assemblies:												
10A	Forward L.S. Panel Assy., No. FLS17	1	1	1									6042639
10B	Forward L.S. Panel Assy., No. FLS27	1	1	1									6042636
10C	Forward L.S. Panel Assy., No. FLS29				1	1	1	1	1	1	1	1	6042640
10D	Forward L.S. Panel Assy., No. FLS33				1	1	1	1	1	1	1	1	6042638
11	Jacket Auxiliary L.S. Panel Assy., No. ALS24												
12	Jacket Rearward Left Side Panel Assemblies:												
12A	Rearward L.S. Panel Assy., No. RLS15	1			1						1		6042641
12B	Rearward L.S. Panel Assy., No. RLS17	1	1	1	1	1	1						6042645
12C	Rearward L.S. Panel Assy., No. RLS21			1		1		1				1	6042642
12D	Rearward L.S. Panel Assy., No. RLS27			1			1		1				6042643
12E	Rearward L.S. Panel Assy., No. RLS29							1	1	1	1	1	6042646
12F	Rearward L.S. Panel Assy., No. RLS33										1		6042644
13	Jacket Forward Right Side Heater Panel Assemblies:												
13A	Forward R.S. Heater Pnl. Assy., No. FRH17	1	1	1									6042627
13B	Forward R.S. Heater Pnl. Assy., No. FRH27	1	1	1									6042624
13C	Forward R.S. Heater Pnl. Assy., No. FRH29				1	1	1	1	1	1	1	1	6042628
13D	Forward R.S. Heater Pnl. Assy., No. FRH33				1	1	1	1	1	1	1	1	6042626
14	Jacket Auxiliary Right Side Heater Panel Assy., No. ARH24												
15	Jacket Rearward Right Side Heater Panel Assemblies:												
15A	Rearward R.S. Htr. Pnl. Assy., No. RRH15	1			1						1		6042629
15B	Rearward R.S. Htr. Pnl. Assy., No. RRH17	1	1	1	1	1	1						6042633
15C	Rearward R.S. Htr. Pnl. Assy., No. RRH21			1		1		1				1	6042630
15D	Rearward R.S. Htr. Pnl. Assy., No. RRH27				1		1		1				6042631
15E	Rearward R.S. Htr. Pnl. Assy., No. RRH29							1	1	1	1	1	6042634
15F	Rearward R.S. Htr. Pnl. Assy., No. RRH33										1		6042632
16	Thumb Hole Bushing, Heyco #2166, Black	10	12	12	12	14	14	16	16	16	18	20	8136257



**STEAM TRIM / WATER TRIM**

STEAM TRIM	V1104-6	V1107-9	V1110-12	V1113-17	V1118-20	V1121-23	PART NO.
Pressuretrol, Honeywell L404A1354	1	1	1	1	1	1	80160301
Steam Gauge, 4" Dia., 30"-0-30 PSI, ¼" NPT	1	1	1	1	1	1	8056022
Gauge Glass Set, ConBraCo #20-104-10 (8-5/8")	1	1	1	1	1	1	8056150
Safety Valve Piping:							
Nipple, 3" NPT x Close, Black	1	1	1	1	1		806600223
Nipple, 3" NPT x 4", Black						1	806600110
Tee, 3" NPT, Black	1	1	1	1	1	1	806601064
Hex Bushing, 3" NPT x 1½" FPT, Black	1						806600560
Hex Bushing, 3" NPT x 1½" FPT, Black		1					806600542
Hex Bushing, 3" NPT x 2" FPT, Black			1				806600557
Hex Bushing, 3" NPT x 2½" FPT, Black				1			806600543
Safety Valve, ConBraCo #13-213-08, 1½" MPT x 1½" FPT	1						81660505
Safety Valve, ConBraCo #13-214-08, 1½" MPT x 2" FPT		1					81660503
Safety Valve, ConBraCo #12-205-08, 2" MPT x 2" FPT			1				81660507
Safety Valve, ConBraCo #12-206-08, 2½" MPT x 2½" FPT				1			81660508
Safety Valve, ConBraCo #12-208-08, 3" MPT x 3" FPT					1		81660509
Safety Valve, ConBraCo #14-207-08, 3" MPT x 3" FPT						1	81660521
Hex Bushing, ¾" MPT x ¼" FPT, Black (Mount Syphon)	1	1	1	1	1	1	806600508
Hex Bushing, 3" MPT x ¾" FPT, Black (Mount Drain Cock)	1	1	1	1	1	1	806600509
Hex Bushing, ½" MPT x ¼" FPT, Black (Mount Steam Gauge)	1	1	1	1	1	1	806600524
Drain Cock, ¾" x 1½" Lg. ConBraCo #31-606-02	1	1	1	1	1	1	806603011
Syphon, ¼" x 90°, 1-7/8" x 4" Extended Leg	1	1	1	1	1	1	806603010
Plug Extra Tappings:							
Pipe Plug, ¾" NPT, Countersunk, Black	1	1	1	1	1	1	806603504
Pipe Plug, 1" NPT, Countersunk, Black	1	1	1	1	1	1	806603517
Pipe Plug, ¾" NPT, Square Head, Black	2	2	2	2	2	2	806603512
Pipe Plug, 1" NPT, Square Head, Black	3	3	3	3	3	3	806603501
Pipe Plug, 3" NPT, Square Head, Black	3	3	3	3	3	3	806603514
Lowest Permissible Water Level Plate, Form No. 1204A	1	1	1	1	1	1	81460009

WATER TRIM	V1104-7	V1108-11	V1112-20	V1121-23	PART NO.
Aquastat Controller, Honeywell L4006A2015	1	1	1	1	80160400U
Immersion Well, Honeywell #123871A, ¾" NPT	1	1	1	1	80160452
Temperature Pressure Gauge, 100 PSI, 80-320°F, ½" NPT	1	1	1	1	8056028
Relief Valve Piping:					
Hex Bushing, 3" NPT x ¾" FPT, Black	1				806600509
Hex Bushing, 3" NPT x 1" FPT, Black		1			806600559
Hex Bushing, 3" NPT x 1¼" FPT, Black			1		806600560
Hex Bushing, 3" NPT x 1½" FPT, Black				1	806600542
Nipple, ¾" NPT x 3" Lg., Black	1				806600002
Nipple, 1" NPT x 3" Lg., Black		1			806600027
Nipple, 1¼" NPT x 3" Lg., Black			1		806600005
Nipple, 1½" NPT x 3" Lg., Black				1	806600006
Street Elbow, ¾" NPT x 90°, Malleable	1				806601501
Street Elbow, 1" NPT x 90°, Malleable		1			806601514
Street Elbow, 1¼" NPT x 90°, Malleable			1		806601516
Street Elbow, 1½" NPT x 90°, Malleable				1	806601517
Relief Valve, ConBraCo #10-614-10, ¾" x 1" FPT, 50# Working Pressure	1				81660359
Relief Valve, ConBraCo #10-615-10, 1" x 1¼" FPT, 50# Working Pressure		1			81660362
Relief Valve, ConBraCo #10-616-10, 1¼" x 1½" FPT, 50# Working Pressure			1		81660357
Relief Valve, ConBraCo #10-617-10, 1½" x 2" FPT, 50# Working Pressure				1	81660364
Hex Bushing, 3" NPT x ¾" FPT, Black (Mount Drain Cock)	1	1	1	1	806600509
Drain Cock, ¾" NPT x 1½" Lg., ConBraCo #31-606-02	1	1	1	1	806603011
Plug Extra Tappings:					
Pipe Plug, ½" NPT, Countersunk, Black	2	2	2	2	806603510
Pipe Plug, ¾" NPT, Countersunk, Black	1	1	1	1	806603504
Pipe Plug, 1" NPT, Countersunk, Black	1	1	1	1	806603517
Pipe Plug, ¾" NPT, Square Head, Black	2	2	2	2	806603512
Pipe Plug, 1" NPT, Square Head, Black	3	3	3	3	806603501
Pipe Plug, 3" NPT, Square Head, Black	2	2	1		806603514
Pipe Plug, 4" NPT, Square Head, Black	1	1	1	1	806603590

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## Service Schedule

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Date

Service Performed

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## Service Schedule

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Date

Service Performed

**BURNHAM CORPORATION**  
**Ten Year Limited Warranty**  
**COMMERCIAL CAST IRON BOILERS**  
**SERIES 5B, 8B, V9, and V11**

Burnham Corporation ("Burnham") hereby warrants to the original owner ("Owner") of each Series 5B, 8B, V9, and V11 commercial cast iron boiler (a "Boiler") manufactured by Burnham, as follows:

**First Year - Limited Warranty:** Burnham warrants that each Boiler will comply, at the time of manufacture, with recognized hydronics industry regulatory standards and requirements as then in effect and will be free from defects in material and workmanship under normal usage for a period of one year from the date of original installation. Subject to all of the terms and conditions set forth below, if any Boiler, cast iron section, or component part covered by this warranty is found not to conform with this warranty during the one year warranty period, Burnham will, at its option, repair or replace the non-conforming Boiler, cast iron section, or covered component part.

**Second through 10th Year - Limited Warranty for Cast Iron Sections:** Burnham warrants that the cast iron sections of each Boiler will be free from defects in material and workmanship under normal usage for a period of ten years from the date of original installation. Subject to all of the terms and conditions set forth below, if any cast iron section covered by this warranty is found not to conform with this warranty during the warranty period, Burnham will, at its option, repair or replace the non-conforming cast iron section. The foregoing warranties are subject to the following terms and conditions:

1. **Applicability.** These warranties extend only to the original Owner at the original installation site and may not be assigned or otherwise transferred or extended to any other person or entity.
2. **Claim Procedure.** Owner must contact the original installer and provide the installer with a detailed description of the claimed defect. If the original installer is unable to resolve the matter to Owner's satisfaction, Owner must notify Burnham in writing at Burnham Corporation, P.O. 3079, Lancaster, PA 17604, which notice must be received by Burnham prior to the expiration of the applicable warranty period. Owner must make the Boiler available for inspection by Burnham and, if requested to do so by Burnham, must return the Boiler, cast iron section or defective component part to Burnham, at Owner's expense, for inspection and/or repair. Owner must cooperate with Burnham and take all commercially reasonable efforts to resolve and settle any dispute arising in connection with a warranty claim before resorting to legal remedies in court.
3. **Conditions.** The foregoing warranties are subject to the following conditions:
  - a.) **Installation Location.** The Boiler must be installed within the continental limits of the United States and Canada.
  - b.) **Proper Installation.** The Boiler must be installed by a qualified heating contractor (whose principal business is the sale, installation and maintenance of commercial boilers and related equipment) in strict accordance with the Installation and Operating Instructions Manual furnished with the Boiler and must not have been damaged prior to or during installation.
  - c.) **Annual Service.** The Boiler (including its related burner, controls, and other components and accessories) must be serviced annually by a qualified heating contractor (whose principal business is the sale, installation and maintenance of commercial boilers and related equipment) and proof of such service must be provided with each warranty claim. The required annual service must include all service and maintenance procedures specified in the Installation and Operating Instructions Manual furnished with the Boiler and all service and maintenance procedures specified in any instruction manual or similar document prepared by the manufacturer of the burner, controls and other components and accessories. Such annual service must also be performed in accordance with all applicable industry standards and procedures.
  - d.) **Proper Operation and Maintenance.** The Boiler must be operated and maintained in strict accordance with the Installation and Operating Instructions Manual furnished with the Boiler and all applicable industry standards and procedures.
  - e.) **No Alterations.** The Boiler must not have been modified, altered or changed in any manner.
  - f.) **Proper Application.** The Boiler must be used exclusively for purposes of commercial space heating or domestic hot water generation through a heat exchanger (or for a combination of such purposes).

4. **Exclusions.** The foregoing warranties do not cover claims arising from or relating to any of the following:

- a.) **Component Parts and Accessories.** Claims relating to component parts and accessories manufactured by others are not covered by these warranties and will be subject only to the manufacturer's warranty, if any.
  - b.) **Improper Installation.** Claims arising from or relating to improper installation are not covered by these warranties.
  - c.) **Natural Disasters.** Claims arising from or relating to damage caused by natural disasters, including, but not limited to, lightning, fire, earthquake, hurricane, tornado, or floods are not covered by these warranties.
  - d.) **Alterations.** Claims arising from or relating to any alteration or other modification not authorized by Burnham in writing are not covered by these warranties.
  - e.) **Misuse.** The following claims are not covered by these warranties: claims arising from or relating to (i) misuse, abuse, mishandling, accident, neglect or improper service or operation of a Boiler, including, but not limited to, improper burner adjustment, control setting or maintenance and thermal shock from low water temperatures; (ii) operation of a Boiler over its rated capacity; (iii) operation of a Boiler with insufficient water, excessive fresh make-up water or inadequately deaerated water; (iv) freezing of a Boiler or any part or component thereof; (v) operation with combustion air contaminated externally by chemical vapors or other contaminants, (vi) use of improper fuel additives; or (vii) operation of a Boiler with inadequately or improperly treated water that causes deposit build-up in the cast iron sections or other Boiler components.
  - f.) **Subsequently Installed Accessories.** Claims arising from or relating to Boiler accessories (including, but not limited to, circulators, air elimination devices, deaerators, flow controls and low water cutoffs) which are installed by Owner after delivery of the Boiler are not covered by these warranties.
5. **Exclusive Remedy.** If any Boiler, cast iron section or covered component part fails to conform to these warranties, Owner's exclusive remedy shall be to accept, at the option of Burnham, repair or replacement of the non-conforming Boiler, cast iron section or other component part. These warranties do not cover labor and other costs and expenses associated with the removal and replacement of a non-conforming Boiler, cast iron section or other component part, which costs and expenses shall be the sole responsibility of Owner.
6. **Limitation of Damages.** Under no circumstances shall Burnham be liable to Owner or to any other person for any indirect, incidental, special, consequential, or punitive damages of any kind whatsoever under these warranties or otherwise (including, without limitation, injury or damage to persons or property, loss of time or labor expense involved in repairing or replacing a non-conforming Boiler, loss of the use of the Boiler, and loss of profits, revenues or business, even if Burnham has been advised of the possibility of such damages), whether such damages are sought based upon breach of warranty, breach of contract, negligence, strict liability or any other legal theory. Burnham's liability under these warranties shall under no circumstances exceed the purchase price paid by the Owner for the Boiler involved.
7. **Exclusivity and Disclaimer.** These warranties are given in lieu of all other express warranties and set forth the entire obligation of Burnham with respect to any defective or otherwise non-conforming Boiler and Burnham shall have no obligations, responsibilities or liabilities of any kind whatsoever, except as set forth herein. EXCEPT AS SET FORTH IN THESE WARRANTIES, BURNHAM MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY, ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE AND ANY OTHER IMPLIED WARRANTY ARISING OUT OF A COURSE OF DEALING OR PERFORMANCE, CUSTOM, USAGE OF TRADE OR OTHERWISE.
8. **No Authority to Expand Warranty.** No sales representative, agent or distributor or has authority to expand or otherwise modify in any way the scope of these warranties or the obligations of Burnham hereunder. No such modification shall be binding unless set forth in a written document signed by a duly authorized officer of Burnham.
9. **Effective Date.** This statement of warranties is effective as to all Boilers sold on or after July 17, 2000 and supersedes all prior warranty statements.