



Kelly D. Taylor
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April 11, 2016

Division of Air Quality
William F. Durham, Director
601 57th Street
Charleston, WV 25304

RE: Ripley Compressor Station
Permit Number R30-03500003-2012
Request for Permit Determination



Mr. Durham,

Columbia Gas Transmission, LLC is submitting this Request for Determination for the Ripley Compressor Station. The request is regarding the replacement of the existing 4MMBtu/hr natural gas fired boiler (BLR1) with a 3.68 MMBtu/hr natural gas fired boiler.

Should you have any questions or need additional information, please contact me.

Respectfully,

A handwritten signature in blue ink that reads "Kelly D. Taylor". The signature is written over a horizontal line.

Kelly D. Taylor
Environmental Policy and Permitting
1700 MacCorkle Ave SE
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SECTION 1

Permit Determination Form



WEST VIRGINIA
 DEPARTMENT OF ENVIRONMENTAL PROTECTION
 DIVISION OF AIR QUALITY
 601 57th Street, SE
 Charleston, WV 25304
 Phone: (304) 926-0475
 www.dep.wv.gov/daq

**PERMIT DETERMINATION FORM
(PDF)**

FOR AGENCY USE ONLY: PLANT I.D. # _____
 PDF # _____ PERMIT WRITER: _____

1. NAME OF APPLICANT (AS REGISTERED WITH THE WV SECRETARY OF STATE'S OFFICE):

Columbia Gas Transmission, LLC

2. NAME OF FACILITY (IF DIFFERENT FROM ABOVE):

Ripley Compressor Station

3. NORTH AMERICAN INDUSTRY CLASSIFICATION SYSTEM (NAICS) CODE:

486211

4A. MAILING ADDRESS:

1700 MacCorkle Avenue, SE
 Charleston WV 25314

4B. PHYSICAL ADDRESS:

State Route 21, Ripley WV 25275

5A. DIRECTIONS TO FACILITY (PLEASE PROVIDE MAP AS ATTACHMENT A):

Traveling I-79N from Charleston, exit at Ripley onto US Rte. 33 and proceed to the town of Ripley and the intersection with Secondary Rte. 21 (formerly US & State Rte. 21). Turn left onto Rte. 21 and continue approximately 5.5 miles to the station which is on the left.

5B. NEAREST ROAD:

State Route 21

5C. NEAREST CITY OR TOWN:

Ripley

5D. COUNTY:

Jackson

5E. UTM NORTHING (KM):

4,303.4

5F. UTM EASTING (KM):

440.1

5G. UTM ZONE:

17

6A. INDIVIDUAL TO CONTACT IF MORE INFORMATION IS REQUIRED:

Kelly D. Taylor

6B. TITLE:

Senior Env. Engineer

6C. TELEPHONE:

304-357-2047

6D. FAX:

304-357-2770

6E. E-MAIL:

kellytaylor@cpg.com

7A. DAQ PLANT I.D. NO. (FOR AN EXISTING FACILITY ONLY):

035 - 00003

7B. PLEASE LIST ALL CURRENT 45CSR13, 45CSR14, 45CSR19 AND/OR TITLE V (45CSR30) PERMIT NUMBERS ASSOCIATED WITH THIS PROCESS (FOR AN EXISTING FACILITY ONLY):

R30-03500003-2012

7C. IS THIS PDF BEING SUBMITTED AS THE RESULT OF AN ENFORCEMENT ACTION? IF YES, PLEASE LIST:

No

8A. TYPE OF EMISSION SOURCE (CHECK ONE):

- NEW SOURCE ADMINISTRATIVE UPDATE
 MODIFICATION OTHER (PLEASE EXPLAIN IN 11B)

8B. IF ADMINISTRATIVE UPDATE, DOES DAQ HAVE THE APPLICANT'S CONSENT TO UPDATE THE EXISTING PERMIT WITH THE INFORMATION CONTAINED HEREIN?

YES NO

9. IS DEMOLITION OR PHYSICAL RENOVATION AT AN EXISTING FACILITY INVOLVED?

YES NO

10A. DATE OF ANTICIPATED INSTALLATION OR CHANGE:

6/1/2016

10B. DATE OF ANTICIPATED START-UP:

6/15/2016

11A. PLEASE PROVIDE A DETAILED PROCESS FLOW DIAGRAM SHOWING EACH PROPOSED OR MODIFIED PROCESS EMISSION POINT AS ATTACHMENT B.

11B. PLEASE PROVIDE A DETAILED PROCESS DESCRIPTION AS ATTACHMENT C.

12. PLEASE PROVIDE MATERIAL SAFETY DATA SHEETS (MSDS) FOR ALL MATERIALS PROCESSED, USED OR PRODUCED AS ATTACHMENT D. FOR CHEMICAL PROCESSES, PLEASE PROVIDE A MSDS FOR EACH COMPOUND EMITTED TO AIR.

13A. REGULATED AIR POLLUTANT EMISSIONS:

⇒ FOR A NEW FACILITY, PLEASE PROVIDE PLANT WIDE EMISSIONS BASED ON THE POTENTIAL TO EMIT (PTE) FOR THE FOLLOWING AIR POLLUTANTS INCLUDING ALL PROCESSES.

⇒ FOR AN EXISTING FACILITY, PLEASE PROVIDE THE PROPOSED CHANGE IN EMISSIONS BASED ON THE PTE OF ALL PROCESS CHANGES FOR THE FOLLOWING AIR POLLUTANTS.

PTE FOR A GIVEN POLLUTANT IS TYPICALLY BEFORE AIR POLLUTION CONTROL DEVICES AND IS COLLECTED BASED ON THE MAXIMUM DESIGN CAPACITY OF PROCESS EQUIPMENT.

POLLUTANT	HOURLY PTE (LB/HR)	YEARLY PTE (TON/YR) (HOURLY PTE MULTIPLIED BY 8760 HR/YR) DIVIDED BY 2000 LB/TON
PM	0.0	0.00
PM ₁₀	0.0	0.00
VOCs	0.0	-0.01
CO	-0.03	-0.12
NO _x	-0.03	-0.14
SO ₂	0.00	0.00
Pb	0.00	0.00
HAPs (AGGREGATE AMOUNT)	0.00	0.00
TAPs (INDIVIDUALLY)*		
OTHER (INDIVIDUALLY)*		

* ATTACH ADDITIONAL PAGES AS NEEDED

13B. PLEASE PROVIDE ALL SUPPORTING CALCULATIONS AS ATTACHMENT E.

CALCULATE AN HOURLY AND YEARLY PTE OF EACH PROCESS EMISSION POINT (SHOWN IN YOUR DETAILED PROCESS FLOW DIAGRAM) FOR ALL AIR POLLUTANTS LISTED ABOVE INCLUDING INDIVIDUAL HAP'S (LISTED IN SECTION 112[b] OF THE 1990 CAAA), TAP'S (LISTED IN 45CSR27), AND OTHER AIR POLLUTANTS (E.G. POLLUTANTS LISTED IN TABLE 45-13A OF 45CSR13, MINERAL ACIDS PER 45CSR7, ETC.).

14. CERTIFICATION OF DATA

I, Timothy L. Greeney (TYPE NAME) ATTEST THAT ALL THE REPRESENTATIONS CONTAINED IN THIS APPLICATION, OR APPENDED HERETO, ARE TRUE, ACCURATE, AND COMPLETE TO THE BEST OF MY KNOWLEDGE BASED ON INFORMATION AND BELIEF AFTER REASONABLE INQUIRY, AND THAT I AM A RESPONSIBLE OFFICIAL** (PRESIDENT, VICE PRESIDENT, SECRETARY OR TREASURER, GENERAL PARTNER OR SOLE PROPRIETOR) OF THE APPLICANT.

SIGNATURE OF RESPONSIBLE OFFICIAL: 

TITLE: MANAGER OF OPERATIONS DATE: 4 / 11 / 2016

** THE DEFINITION OF THE PHRASE 'RESPONSIBLE OFFICIAL' CAN BE FOUND AT 45CSR13, SECTION 2.23.

NOTE: PLEASE CHECK ENCLOSED ATTACHMENTS:
 ATTACHMENT A ATTACHMENT B ATTACHMENT C ATTACHMENT D ATTACHMENT E

RECORDS ON ALL CHANGES ARE REQUIRED TO BE KEPT AND MAINTAINED ON-SITE FOR TWO (2) YEARS.
 THE PERMIT DETERMINATION FORM WITH THE INSTRUCTIONS CAN BE FOUND ON DAQ'S PERMITTING SECTION WEB SITE:
www.dep.wv.gov/daq

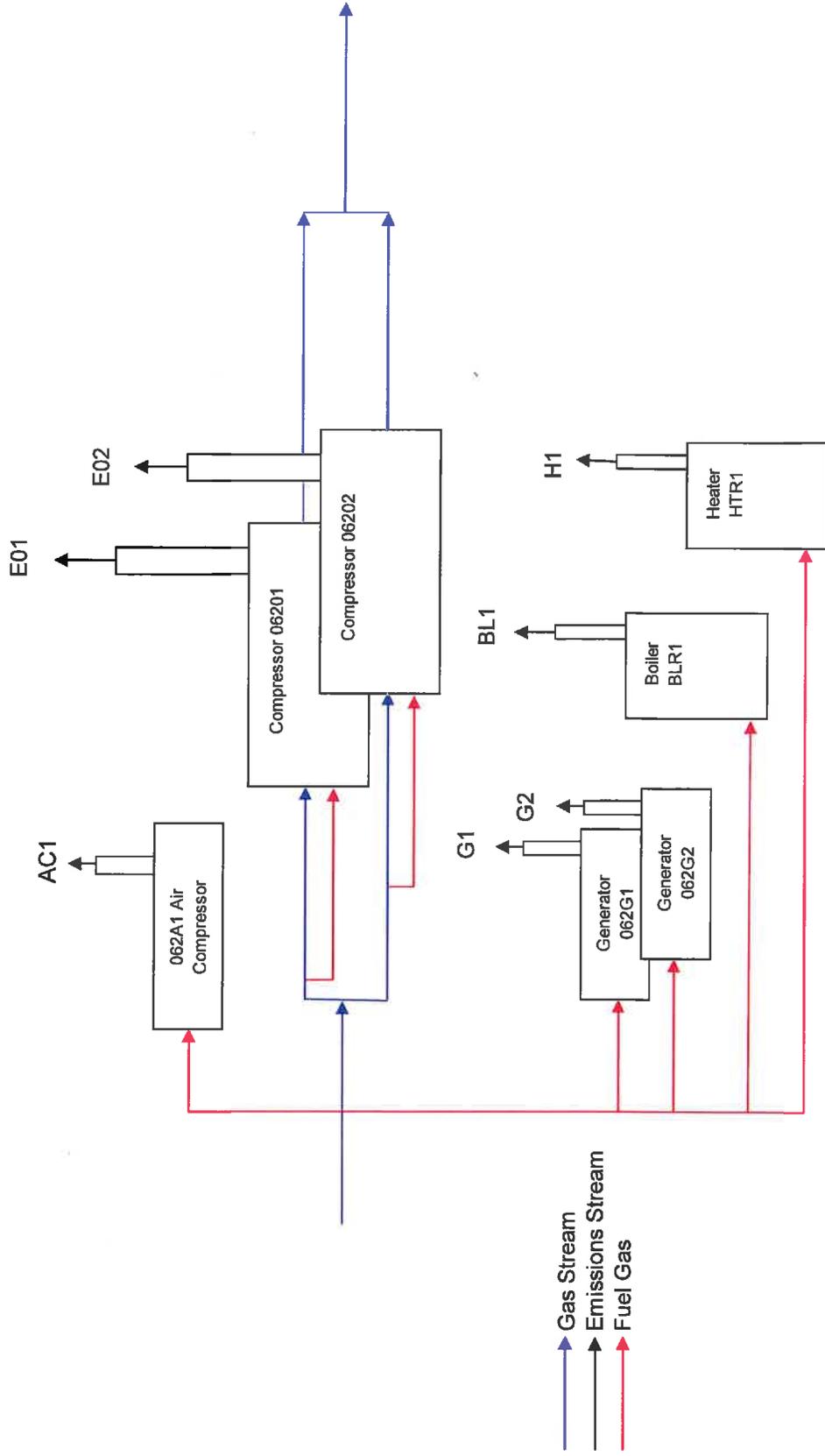
ATTACHMENT A

Area Map

ATTACHMENT B

Process Flow Diagram

RIPLEY COMPRESSOR STATION PROCESS FLOW DIAGRAM



ATTACHMENT C
Process Description

ATTACHMENT C

Process Description

Columbia Gas Transmission, LLC (Columbia) proposes to replace the existing heating system boiler (BLR1) with a heat input rating of 4.0 MMBtu/hr with a new boiler (BLR2) with a heat input rating of 3.68 MMBtu/hr at the Ripley Compressor Station. The replacement boiler is to provide low pressure steam for the heaters in the site buildings. During the project, BLR1 will be completely removed and BLR2 installed in its place.

ATTACHMENT E

Support Emissions Calculations

**Columbia Gas Transmission, LLC
 Ripley Compressor Station
 Boiler Replacement Project**

**Attachment E - Emission Calculations
 Emission Changes**

Chemical	Emissions Change in Lb/Hour		
	Current Unit	New Unit	Difference
NOx	0.39	0.36	-0.03
CO	0.33	0.30	-0.03
PM	0.01	0.01	0.00
PM10	0.01	0.01	0.00
SO2	0.02	2.10E-02	0.00
VOC	0.02	0.02	0.00
Total HAPS	7.41E-03	6.81E-03	0.00

	Emissions Change in Tons/Year		
	Current Unit	New Unit	Difference
	1.72	1.58	-0.14
	1.44	1.33	-0.12
	0.03	0.03	0.00
	0.03	0.03	0.00
	1.25E-02	1.15E-02	0.00
	0.09	0.09	-0.01
	3.24E-02	2.98E-02	0.00

**Columbia Gas Transmission, LLC
Ripley Compressor Station**

Existing Heating System Boiler #1 (BLR1)

Heat Input 4 MMBtu/hr
 Operating Hours 8760 hr/yr
 Natural Gas Heat Content 1020 Btu/scf
 Fuel Consumption 34.35 MMscf/yr
 3921.6 scf/hr

Pollutant	Emission Factor		Emission Rate		Emission Factor Reference
	lb/MMscf	lb/MMBtu	lb/hr	ton/yr	
NO _x	100	0.098	0.39	1.72	AP-42 Table 1.4-1 (7/98)
CO	84	0.082	0.33	1.44	AP-42 Table 1.4-1 (7/98)
GHG (CO ₂ e)		117.1	468	2,052	40 CFR 98 Subpart C
PM ₁₀	1.9	0.002	0.01	0.03 †	AP-42 Table 1.4-2 (7/98)
PM _{2.5}	1.9	0.002	0.01	0.03	AP-42 Table 1.4-2 (7/98)
VOC	5.5	0.005	0.02	0.09	AP-42 Table 1.4-2 (7/98)
SO ₂ (Maximum Hourly)		0.00571	0.02		2 grains S / 100 scf
SO ₂ (Average Annual)		0.000714		1.25E-02	0.25 grains S / 100 scf
Formaldehyde	0.075	0.00007	2.94E-04	1.29E-03	AP-42 Table 1.4-3 (7/98)
Total HAPs	1.89	0.00185	7.41E-03	3.24E-02	AP-42 Table 1.4-3 & 4 (7/98)

**Columbia Gas Transmission, LLC
Ripley Compressor Station**

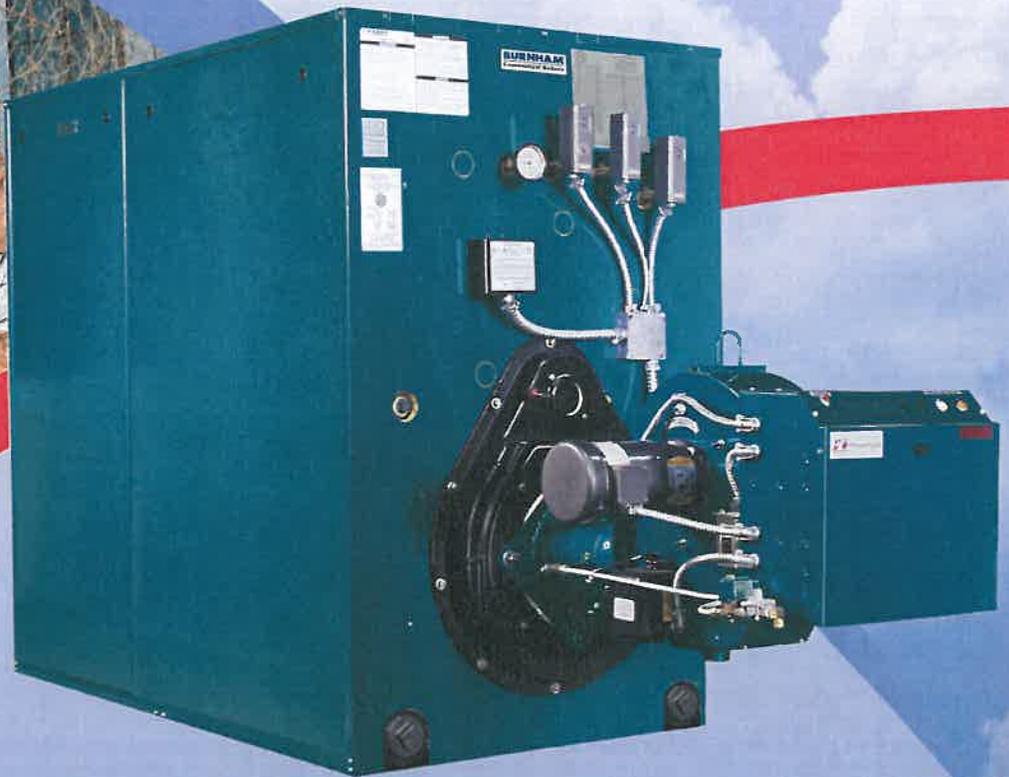
Replacement Heating System Boiler (BLR2)

Heat Input 3.68 MMBtu/hr
 Operating Hours 8760 hr/yr
 Natural Gas Heat Content 1020 Btu/scf
 Fuel Consumption 31.60 MMscf/yr
 3607.8 scf/hr

Pollutant	Emission Factor		Emission Rate		Emission Factor Reference
	lb/MMscf	lb/MMBtu	lb/hr	ton/yr	
NO _x	100	0.098	0.36	1.58	AP-42 Table 1.4-1 (7/98)
CO	84	0.082	0.30	1.33	AP-42 Table 1.4-1 (7/98)
GHG (CO _{2e})		117.1	431	1,887	40 CFR 98 Subpart C
PM ₁₀	1.9	0.002	0.01	0.03	AP-42 Table 1.4-2 (7/98)
PM _{2.5}	1.9	0.002	0.01	0.03	AP-42 Table 1.4-2 (7/98)
VOC	5.5	0.005	0.02	0.09	AP-42 Table 1.4-2 (7/98)
SO ₂ (Maximum Hourly)		0.00571	0.02		2 grains S / 100 scf
SO ₂ (Average Annual)		0.000714		1.15E-02	0.25 grains S / 100 scf
Formaldehyde	0.075	0.00007	2.71E-04	1.19E-03	AP-42 Table 1.4-3 (7/98)
Total HAPs	1.89	0.00185	6.81E-03	2.98E-02	AP-42 Table 1.4-3 & 4 (7/98)

V11 Series

Cast Iron Commercial Water or Steam Boiler



- 837 to 5733 MBH Input
- Oil, Gas, or Oil/Gas Combination
- 30, 50, or 80 PSI
- Cast Iron Sectional Design
- Water or Steam
- Top or Rear Venting
- Exclusive Optional SBC Boiler Control
M aximizes System Efficiency

BURNHAM[®]
Commercial Boilers

V11 Series

Cast Iron Commercial Water or Steam Boiler

Your Commercial Heating Solution!

Available in twenty sizes with gross output ratings from 667 to 4551 MBH, the V11 Series is commonly used in schools, hospitals, and other large commercial applications where comfort and reliability are critical. The product meets the energy efficiency requirements of ASHRAE 90.1 with combustion efficiencies up to 85%.

Cast iron construction, ease of assembly, two venting options, and stringent testing methods make the V11 Series boiler by Burnham Commercial your commercial heating solution.

American-Made Cast Iron Construction BC25-HSi

Burnham Commercial's unique BC25-HSi cast iron formula has an extremely high silicon content, making it stronger and more flexible than the iron used in competitor's boiler sections. It offers better thermal shock resistance and greater heat transfer capabilities than other cast iron products.



BC25-HSi's properties allow Burnham Commercial to maintain the highest level of quality from start to finish, and provide a product that is optimized for hydronic heating applications.

- **Manufactured with Quality**
Cast iron sections are produced at Burnham Foundry LLC in Ohio, ensuring quality and availability of boiler sections.



- **Cast Iron Nipple Difference**
V11 sections are held together using cast iron nipples, which are well known as being of the highest standard for boiler construction. Unlike gaskets used by many other boiler



manufacturers, cast iron nipples are impervious to flue gases, oils, petroleum-based chemicals and other contaminants, which means fewer costly repairs and a longer lasting boiler.

Installation & Service Flexibility

The cast iron sectional design of the V11 boiler makes it easy to maneuver through doorways and into the boiler room. In addition to being shipped as loose sections, the boiler is available with factory-assembled sections or as a completely packaged and fire-tested unit.

- **Hassle-free Section Assembly**

V11 boiler sections have reinforced lugs that are used to assemble the sections with individual draw rods resulting in fast, strain-free assembly.



The sections can be assembled using two common tools—a 3/4" drive ratchet with a 1-1/16" deep socket and wrench. The sections are surface ground to ensure smooth surface mating. An elastic sealant and fiberglass rope are used on all section joints for a completely sealed and pressure-tight assembly.

- **Extensive Testing Methods**

Each boiler section is hydrostatically tested at 2-1/2 times the rated working pressure at the foundry. Factory-assembled sections are tested a second time at 1.5 times the rated working pressure.

- **Rear or Top Venting**

As a forced draft boiler, the V11 provides optimum draft for controlled efficiency, eliminating the need for high chimneys or induced draft fans. A unique feature of the V11 boiler is that it can be vented from the rear or the top. This enables easy chimney or sidewall venting for maximum installation flexibility. Top outlet venting saves floor space and reduces installation time and materials. A plugged tapping is provided to take flue outlet pressure readings.



Commitment to Quality

Burnham Commercial, "America's Boiler Company," has earned a reputation for quality and dependability. Built for a variety of applications, the V11 Series is right for your next job.

Top or Rear Outlet

with adjustable lock-type damper (not shown); includes plugged tapping for outlet pressure readings

Front Mounted Controls

for easy adjustment and maintenance

Aluminized Steel Canopy

Burner Mounting Plate

with flame observation port

Cast Iron Nipples

ensure the integrity of the section assembly and resist petroleum based chemicals and flue gases

Removable Side Jacket Panels

Easy access to all cleanouts and flue surfaces

Cast Iron Sections

Vertical flue design with pinned heating surface for maximum heat extraction

4 Burner Manufacturers

Options to best fit your needs

Rear Observation Port

Includes plugged tapping for over-fire draft readings

Individual Draw Rods

with reinforced lugs for strain free assembly

Wet Base

Side wall insulation creates improved thermal circulation

Optional Tankless Heater

Provides domestic hot water

Also Available

SBC™

Integrated Boiler Control System

Burnham Commercial's SBC is a complete boiler monitoring and automation system. Available as an option, this exclusive feature was designed and developed by Burnham Commercial's engineers and is available ONLY on Burnham Commercial products.

- Designed to maximize system efficiency and minimize energy usage
- Easily connected to building management systems
- Proven control platform, used successfully for years at other Burnham companies
- Fail-safe design insures boiler operation

SBC Exclusives

- Advanced Adaptability
- Peer-To-Peer Network
- Fail-Safe System Operations
- Boiler Monitoring & Diagnostic Displays
- Modulation Rate and On/Off Modes
- Outdoor Air Temperature Reset
- Warm Weather Shutdown (WWSD)
- Domestic Hot Water Priority (DHWP)
- System Control Outputs

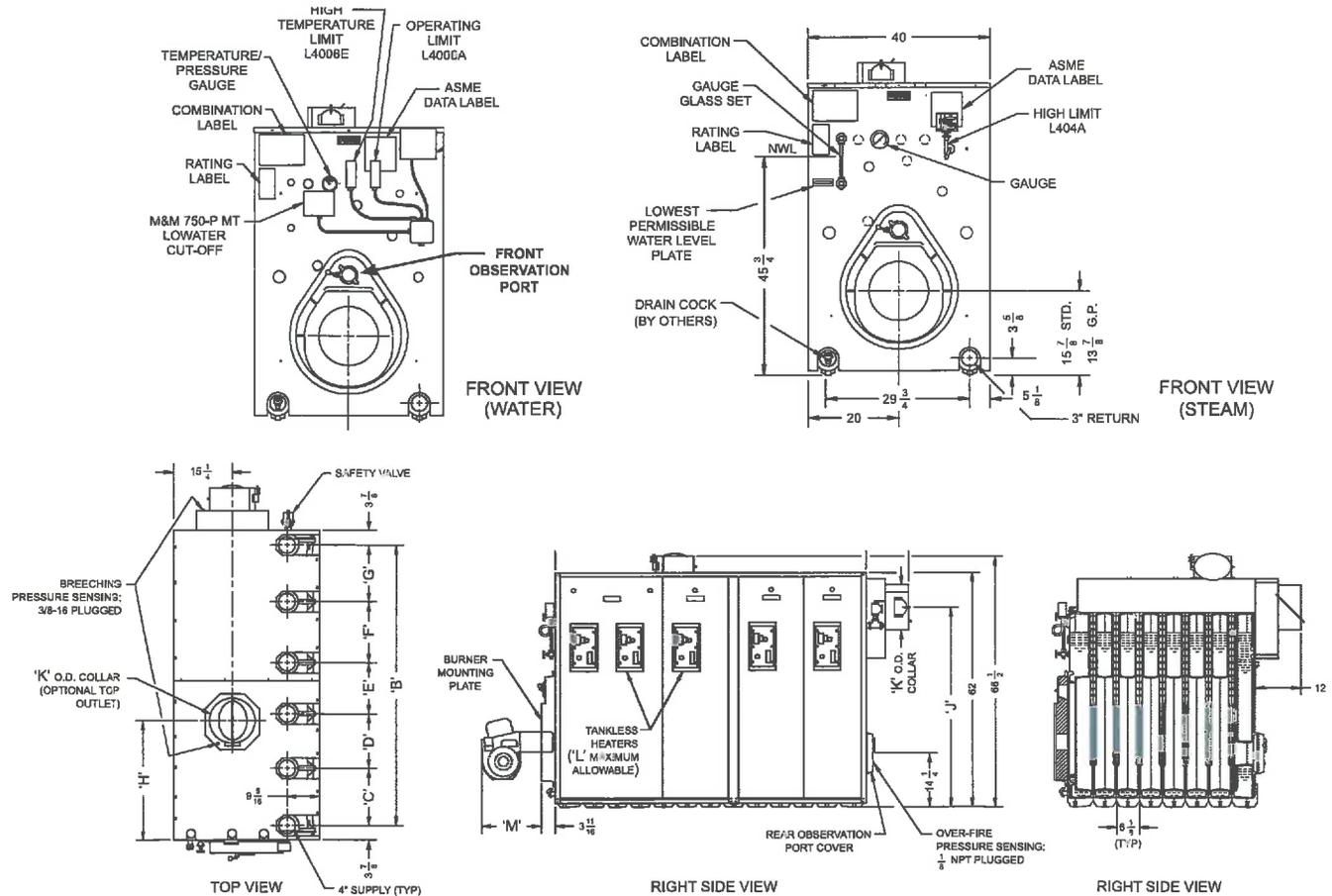
The SBC Boiler Control System Only available from Burnham Commercial!

V11 Series Dimensions

BOILER MODEL	NUMBER OF SECTIONS	'A'	'B'	'C'	'D'	'E'	'F'	'G'	'H'	'J'	'K'	'L'	BURNER DIMENSION - 'M' *						APPROX. WEIGHT OF SECTION (Assembly Only)
													BECKETT		CARLIN	POWERFLAME		WEBSTER	
													CF	CG		CR	JR**		
V1104	4	26-5/8	18-7/8						13-13/16	55	8	1	24-3/4	21-3/4		30	20-1/4	25	1833
V1105	5	32-3/4	25						19-15/16	55	8	2	24-3/4	21-3/4	19-3/4	30	20-1/4	25	2226
V1106	6	38-7/8	31-1/8	31-1/8					26-1/16	55	8	2	24-3/4	28-3/4	19-3/4	35	23-3/4	25	2618
V1107	7	45	37-1/4	37-1/4					32-3/16	54	10	3	24-1/4	29-1/4	20-1/2	35	23-3/4	25	3010
V1108	8	51-1/8	43-3/8	43-3/8					38-5/16	54	10	3	24-1/4	29-1/4	20-1/2	35	23-3/4	25	3403
V1109	9	57-1/4	49-1/2	49-1/2					44-7/16	54	10	4	24-1/4	29-1/4	20-1/2	35	25	25	3795
V1110	10	63-3/8	55-5/8	24-3/4	30-7/8				50-9/16	53	12	4	24-1/4	29-1/4	25-5/8	35	25	25	4188
V1111	11	69-1/2	61-3/4	37	24-3/4				56-11/16	53	12	4	24-1/4	29-5/8	25-5/8	40	29	29	4580
V1112	12	75-5/8	67-7/8	37	30-7/8				56-5/8	53	12	5	25-3/4	29-5/8	25-5/8	40	29	29	4972
V1113	13	81-3/4	74	37	37				53-5/16	53	12	5	25-3/4	29-5/8	26-1/8	40	29	29	5365
V1114	14	87-7/8	80-1/8	24-3/4	24-1/2	30-7/8			53-5/16	52	14	5	27	29-5/8	26-1/8	40	29	29	5757
V1115	15	94	86-1/4	24-3/4	24-1/2	37			53-5/16	52	14	6	27	29-5/8	26-1/8	40	29	29	6150
V1116	16	100-1/8	92-3/8	30-7/8	36-3/4	24-3/4			53-5/16	52	14	6	26	29-5/8	26-1/8	40	29	29	6542
V1117	17	106-1/4	98-1/2	30-7/8	36-3/4	30-7/8			53-5/16	52	14	6	26	29-5/8	26-1/8	40	29	29	6934
V1118	18	112-3/8	104-5/8	30-7/8	24-1/2	24-1/2	24-3/4		53-5/16	51	16	7		29-5/8		40	29	29	7327
V1119	19	118-1/2	110-3/4	30-7/8	24-1/2	24-1/2	30-7/8		53-5/16	51	16	7		29-5/8		40	29	29	7719
V1120	20	124-5/8	116-7/8	30-7/8	24-1/2	36-3/4	24-3/4		53-5/16	51	16	8				40	29	29	8112
V1121	21	130-3/4	123	30-7/8	24-1/2	36-3/4	30-7/8		53-5/16	51	16	8				40	29	29	8504
V1122	22	136-7/8	129-1/8	30-7/8	24-1/2	24-1/2	24-1/2	24-3/4	53-5/16	50	18	9				46	29	29	8896
V1123	23	143	135-1/4	30-7/8	24-1/2	24-1/2	24-1/2	30-7/8	53-5/16	50	18	9				46	29	29	9289

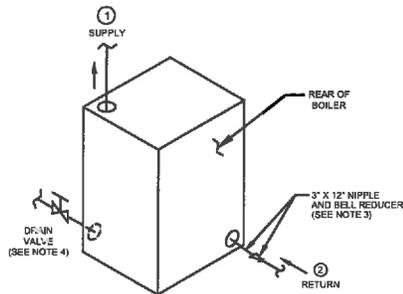
All dimensions in inches

* Burner control panel configuration may change this dimension

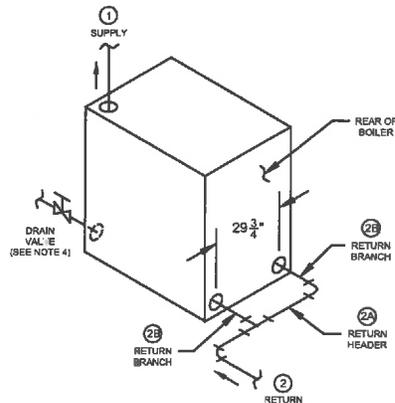


V11 Series Piping Recommendations

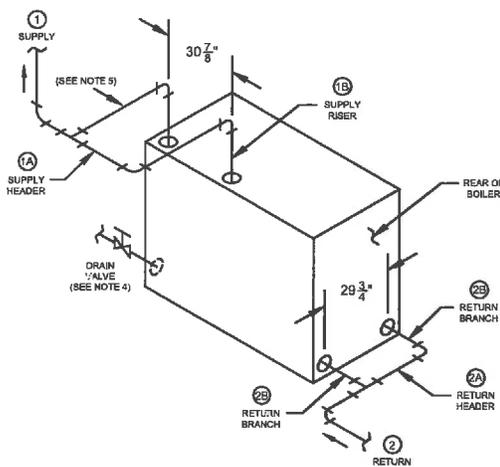
Water Boiler



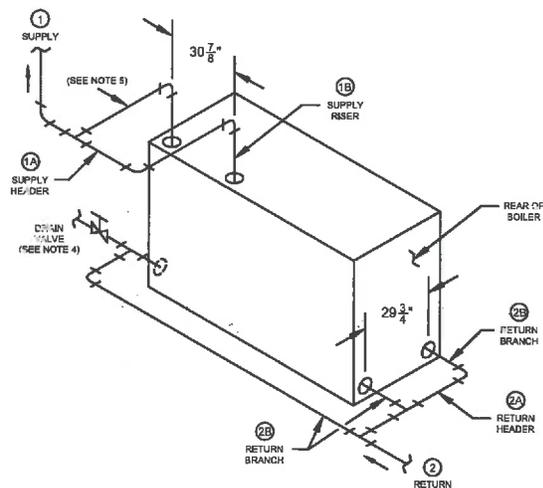
V1104 THRU V1108 (W/20°F DROP)
V1104 THRU V1117 (W/40°F DROP)



V1109 THRU V1115 (W/20°F DROP)
V1118 THRU V1123 (W/40°F DROP)



V1116 AND V1117 (W/20°F DROP)



V1118 THRU V1123 (W/20°F DROP)

Pipe Sizing and Notes

NOTES:

- All piping is schedule 40.
- Pipe size listed are based on a 20° F or 40° F differential (temperature drop). Select one to match application.
- When specified return piping size is less than 3", install 3" x 12" nipple and appropriate size bell reducer directly into boiler return tapping as shown.
- Drain valve - ball valve preferable, gate valve acceptable alternative (supplied by others).
Minimum valve size per ASME code is 3/4" NPT.
- Swing joints on two riser systems may be piped over the top of the boiler if space is limited.
- Boilers require protection from flue gas condensation and thermal shock when operating below 135°F return water temperatures

BOILER MODEL	SUPPLY PIPING SIZE IN INCHES						RETURN PIPING SIZE IN INCHES					
	(1) SUPPLY		(1A) SUPPLY HEADER		(1B) SUPPLY RISER (QTY.) SIZE		(2) RETURN		(2A) RETURN HEADER		(2B) RETURN BRANCH (QTY.) 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	3		(2) 3	
V1110	4	2-1/2					4	2-1/2	3		(2) 3	
V1111	4	2-1/2					4	2-1/2	3		(2) 3	
V1112	4	3					4	3	3		(2) 3	
V1113	4	3					4	3	3		(2) 3	
V1114	4	3					4	3	3		(2) 3	
V1115	4	3					4	3	3		(2) 3	
V1116	5	3	3		(2) 3		5	3	3		(2) 3	
V1117	5	3	3		(2) 3		5	3	3		(2) 3	
V1118	5	4	4		(2) 4		5	4	4	3	(3) 3	(2) 3
V1119	5	4	4		(2) 4		5	4	4	3	(3) 3	(2) 3
V1120	5	4	4		(2) 4		5	4	4	3	(3) 3	(2) 3
V1121	5	4	4		(2) 4		5	4	5	3	(3) 3	(2) 3
V1122	5	4	4		(2) 4		5	4	5	3	(3) 3	(2) 3
V1123	5	4	4		(2) 4		5	4	5	3	(3) 3	(2) 3

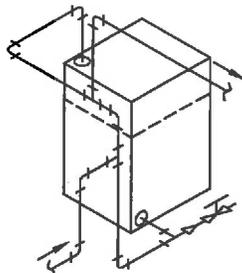
V11 Series Piping Recommendations

Steam Boiler

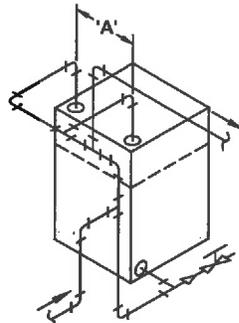
BOILER MODEL	PIPING SIZE IN INCHES				RISER SPACING IN INCHES				
	(1) RISER (QTY.) SIZE	(2) RETURN	(3) HEADER	(4) EQUALIZER	A	B	C	D	E
V1104	(1) 4	2	4	2-1/2					
V1105	(1) 4	2	4	2-1/2					
V1106	(2) 4	2-1/2	6	2-1/2	31-1/8				
V1107	(2) 4	2-1/2	6	2-1/2	37-1/4				
V1108	(2) 4	2-1/2	6	2-1/2	43-3/8				
V1109	(2) 4	2-1/2	6	2-1/2	49-1/2				
V1110	(3) 4	2-1/2	6	2-1/2	24-3/4	30-7/8			
V1111	(3) 4	3	8	4	37	24-3/4			
V1112	(3) 4	3	8	4	37	30-7/8			
V1113	(3) 4	3	8	4	37	37			
V1114	(4) 4	3	8	4	24-3/4	24-1/2	30-7/8		
V1115	(4) 4	3	8	4	24-3/4	24-1/2	37		
V1116	(4) 4	3	8	4	30-7/8	36-3/4	24-3/4		
V1117	(4) 4	3	8	4	30-7/8	36-3/4	30-7/8		
V1118	(5) 4	3	8	4	30-7/8	24-1/2	24-1/2	24-3/4	
V1119	(5) 4	3	10	4	30-7/8	24-1/2	24-1/2	30-7/8	
V1120	(5) 4	3	10	4	30-7/8	24-1/2	36-3/4	24-3/4	
V1121	(5) 4	3	10	4	30-7/8	24-1/2	36-3/4	30-7/8	
V1122	(6) 4	3	10	4	30-7/8	24-1/2	24-1/2	24-1/2	24-3/4
V1123	(6) 4	3	10	4	30-7/8	24-1/2	24-1/2	24-1/2	30-7/8

NOTES:

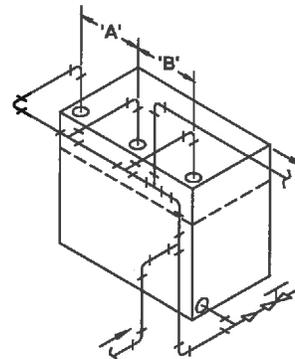
- All piping is schedule 40.
- To prevent condensate from being trapped in header, do not reduce equalizer elbow at header connection.
- Drain/blowoff valve — ball valve preferable, gate valve acceptable alternative (supplied by others).
 - Minimum valve size per ASME code is 1" NPT (V1104-1106), 1-1/4" NPT (V1107-1112), 1-1/2" NPT (V1113-1123).
 - Increasing the valve size will improve the blowdown operation
 - In all cases, piping connecting blowoff valve to boiler shall be full size to the point of discharge.
- Header piping may be run over the top of boiler if space does not allow for piping arrangement shown. However, increased service requirements will result.
- Supply from boiler header must be connected between the first boiler riser and the header drip (or hartford loop). Do not connect supply between risers or opposite end of boiler header.
- For pumped return systems, see V11 installation manual.



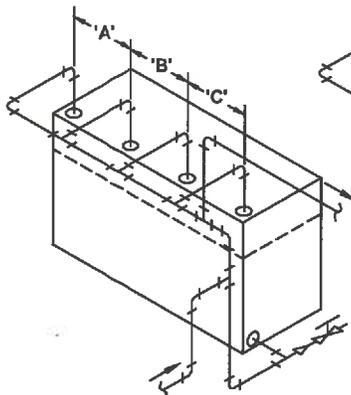
V1104 AND V1105



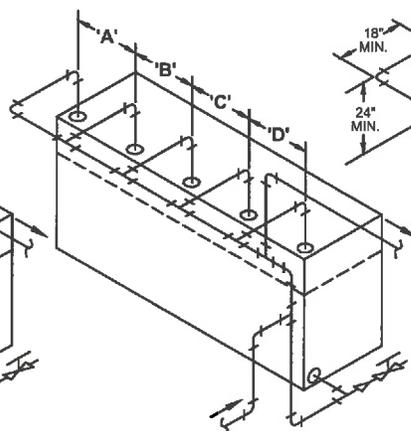
V1106 THRU V1109



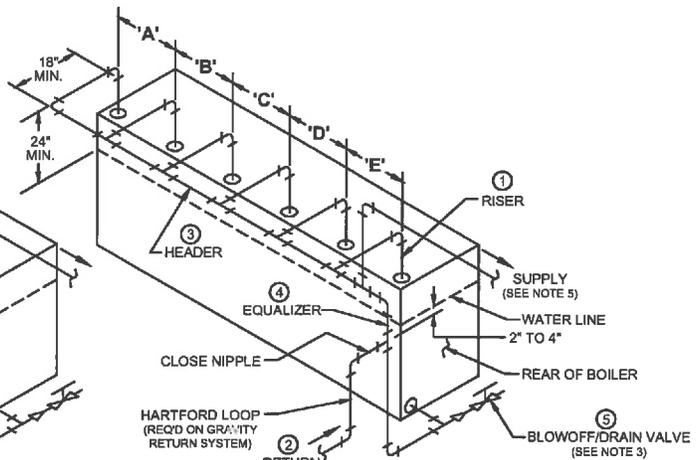
V1110 THRU V1113



V1114 THRU V1117



V1118 THRU V1121



V1122 AND V1123

V11 Series Burner Schedule

OIL BURNERS

BOILER NUMBER	BECKETT		CARLIN		POWER FLAME		WEBSTER	
	BURNER MODEL	H.P.	BURNER MODEL	H.P.	BURNER MODEL	H.P.	BURNER MODEL	H.P.
V1104	CF1400	1/2			CR1-O5	1/2	JB10-03	1/3
V1105	CF1400	1/2	702CRD	1/2	CR1-O5	1/2	JB10-03	1/3
V1106	CF1400	1/2	702CRD	1/2	CR2-OAS	3/4	JB10-03	1/3
V1107	CF2300	3/4	801CRD	3/4	CR2-OAS	3/4	JB10-05	1/2
V1108	CF2300	3/4	801CRD	3/4	CR2-OAS	3/4	JB10-05	1/2
V1109	CF2300	3/4	801CRD	3/4	CR2-OAS	3/4	JB10-07	3/4
V1110	CF2300	3/4	1050FFD	1	CR2-OAS	1-1/2	JB10-07	3/4
V1111	CF2300	3/4	1050FFD	1	CR3-O	2	JB20-10	1
V1112	CF2500	2	1050FFD	1-1/2	CR3-O	2	JB20-10	1
V1113	CF2500	2	1050FFD	1-1/2	CR3-O	2	JB20-10	1
V1114	CF3500	2	1150FFD	1-1/2	CR3-O	2	JB20-10	1
V1115	CF3500	2	1150FFD	1-1/2	CR3-O	2	JB20-10	1
V1116	CF3500	2	1150FFD	1-1/2	CR3-O	3	JB20-15	1-1/2
V1117			1150FFD	1-1/2	CR3-O	3	JB20-30	3
V1118					CR3-OB	3	JB20-30	3
V1119					CR3-OB	3	JB20-30	3
V1120					CR3-OB	3	JB20-30	3
V1121					CR3-OB	3	JB20-50	5
V1122					CR4-OA	5	JB20-50	5
V1123					CR4-OA	5	JB20-50	5

STANDARD BURNER MOTOR VOLTAGE: Beckett – CF1400, and CF2300 are 120/60/1. CF2500 and CF3500 are 240/60/3. Carlin – All sizes 240/60/1. Power Flame – CR1-O5 is 120/60/1. CR2-OAS is 240/60/1. All others are 240/60/3. Webster – JB10-03, JB10-05 and JB10-07 are 120/60/1. JB20-10 is 240/60/1. All others are 240/60/3.

GAS BURNERS*

BOILER NUMBER	BECKETT			POWER FLAME - 'CR'†		POWER FLAME - 'JR'†		WEBSTER		
	BURNER MODEL	H.P.	MIN. GAS PRESS. (IN.)	BURNER MODEL	H.P.	BURNER MODEL	H.P.	BURNER MODEL	H.P.	MIN. GAS PRESS. (IN.)
V1104	CG10.65	1/3	4.6	CR1-G-12	1/3	JR30A-10	1/3	JB1G-03	1/3	6
V1105	CG10.65	1/3	6.6	CR1-G-12	1/2	JR30A-12	1/3	JB1G-03	1/3	4
V1106	CG15.45	1/2	6.2	CR2-G-15	1/2	JR50A-15	1/3	JB1G-03	1/3	6
V1107	CG25.25	3/4	5.2	CR2-G-15	1/2	JR50A-15	1/2	JB1G-05	1/2	5
V1108	CG25.35	3/4	5.0	CR2-G-15	1/2	JR50A-15	1/2	JB1G-05	1/2	5
V1109	CG25.45	3/4	5.2	CR2-G-15	1/2			JB1G-07	3/4	8
V1110	CG25.55	3/4	5.2	CR2-G-20A	1			JB1G-07	3/4	8
V1111	CG50.25	2	5.7	CR3-G-20	1-1/2			JB2G-10	1	8
V1112	CG50.35	2	4.3	CR3-G-20	1-1/2			JB2G-10	1	6
V1113	CG50.35	2	5.7	CR3-G-20	1-1/2			JB2G-10	1	7
V1114	CG50.45	2	5.7	CR3-G-20	1-1/2			JB2G-15	1-1/2	8
V1115	CG50.55	2	5.0	CR3-G-20	1-1/2			JB2G-30	3	8
V1116	CG50.55	2	5.3	CR3-G-25	3			JB2G-30	3	8
V1117	CG50.55	2	6.1	CR3-G-25	3			JB2G-30	3	9
V1118	CG50.55	2	6.9	CR3-G-25B	3			JB2G-30	3	10
V1119	CG50.55	2	7.3	CR3-G-25B	3			JB2G-30	3	11
V1120				CR3-G-25B	3			JB2G-30	3	12
V1121				CR3-G-25B	3			JB2G-50	5	14
V1122				CR4-G-25	3			JB2G-50	5	15
V1123				CR4-G-25	3			JB2G-50	5	16

STANDARD BURNER MOTOR VOLTAGE: Power Flame C Series—CR1-G-12 and CR2-G-15 are 120/60/1. CR2-G-20A is 240/60/1. All others are 240/60/3. Power Flame JR Series – All burners are 120/60/1. Webster—JB1G-03, JB1G-05 and JB1G-07 are 120/60/1. JB2G-10 is 240/60/1. All others are 240/60/3.

* For inlet gas connection size, see Gas/Oil Burner Chart † For minimum gas pressure requirements, see Gas/Oil Burner Chart.

GAS/OIL BURNERS

BOILER NUMBER	POWER FLAME - 'CR' SERIES				WEBSTER			
	BURNER MODEL	H.P.	INLET GAS CONNECTION (IN.)	MIN. GAS PRESS. (IN.)	BURNER MODEL	H.P.	INLET GAS CONNECTION (IN.)	MIN. GAS PRESS. (IN.)
V1104	CR1-GO-12	1/2	1	4.7	JB1C-03	1/3	1	7.0
V1105	CR1-GO-12	1/2	1	4.8	JB1C-03	1/3	1-1/4	4.9
V1106	CR2-GO-15	3/4	1	5.4	JB1C-03	1/3	1-1/4	7.0
V1107	CR2-GO-15	3/4	1	6.4	JB1C-05	1/2	1-1/4	6.2
V1108	CR2-GO-15	3/4	1	7.5	JB1C-05	1/2	1-1/2	6.9
V1109	CR2-GO-15	3/4	1-1/4	6.4	JB1C-07	3/4	1-1/2	7.0
V1110	CR2-GO-20A	1-1/2	1-1/4	5.8	JB1C-07	3/4	1-1/2	7.0
V1111	CR3-GO-20	2	2	5.8	JB2C-10	1	2	6.3
V1112	CR3-GO-20	2	1-1/2	6.0	JB2C-10	1	2	5.6
V1113	CR3-GO-20	2	1-1/2	6.8	JB2C-10	1	2	6.3
V1114	CR3-GO-20	2	1-1/2	7.4	JB2C-10	1	2	7.0
V1115	CR3-GO-20	2	1-1/2	7.3	JB2C-10	1	2	6.8
V1116	CR3-GO-25	3	2	6.6	JB2C-15	1-1/2	2	7.0
V1117	CR3-GO-25	3	2	7.1	JB2C-30	3	2	7.3
V1118	CR3-GO-25B	3	2	7.7	JB2C-30	3	2-1/2	8.1
V1119	CR3-GO-25B	3	2-1/2	6.5	JB2C-30	3	2-1/2	9.2
V1120	CR3-GO-25B	3	2-1/2	7.0	JB2C-30	3	2-1/2	10.0
V1121	CR3-GO-25B	3	2-1/2	7.0	JB2C-50	5	2-1/2	11.0
V1122	CR4-GO-25	5	2-1/2	6.3	JB2C-50	5	2-1/2	12.4
V1123	CR4-GO-25	5	2-1/2	6.9	JB2C-50	5	2-1/2	13.1

STANDARD BURNER MOTOR VOLTAGE: Power Flame - CR1-GO-12 is 120/60/1. CR2-GO-15 and CR2-GO-20A are 240/60/1. All others are 240/60/3. Webster—JB1C-03, JB1C-05, JB1C-07 are 120/60/1. JB2C-10 is 240/60/1. All others are 240/60/3.

**For minimum gas pressure requirements, see Gas Burner Chart. NOTES: 1. The minimum gas pressures shown are for standard UL burners with the standard firing sequence. IRI, FM and CSD-1 requirements may result in different pressures and paces.

Specifications

V11 RATINGS



BOILER MODEL (1)	BOILER H.P.	GROSS OUTPUT MBH (2)	I=B=R NET RATING (3)		WATER MBH	BURNER INPUT		NET FIREBOX VOLUME (IN. WTR. COLUMN)	PRESSURE IN FIREBOX (IN. WTR. COLUMN)	I=B=R VENT DIA. (IN.)	APPROX. SHIPPING AND LIFTING WEIGHT (LBS.)
			STEAM			OIL GPH (4)	GAS MBH				
			MBH	SQ. FT.							
V1104	19.9	667	500	2083	580	5.8	837	7.9	.35	8	2105
V1105	25.6	857	643	2679	745	7.4	1068	10.6	.36	8	2510
V1106	31.9	1069	802	3342	930	9.2	1328	13.2	.37	8	2920
V1107	38.3	1281	963	4013	1114	11.0	1588	15.9	.42	10	3325
V1108	45.3	1517	1159	4829	1319	13.0	1876	18.5	.42	10	3733
V1109	51.7	1729	1335	5563	1503	14.8	2136	21.1	.39	10	4147
V1110	58.0	1941	1507	6279	1688	16.6	2396	23.8	.42	12	4557
V1111	64.3	2154	1672	6967	1873	18.4	2656	26.5	.40	12	4964
V1112	69.7	2334	1812	7550	2030	20.0	2887	29.1	.42	12	5374
V1113	74.8	2503	1943	8096	2177	21.5	3103	31.8	.40	12	5771
V1114	81.6	2730	2120	8833	2374	23.5	3392	34.4	.38	14	6184
V1115	88.3	2957	2296	9567	2571	25.5	3680	37.1	.36	14	6601
V1116	93.4	3129	2427	10113	2718	27.0	3897	39.7	.38	14	7008
V1117	100.2	3353	2603	10846	2916	29.0	4186	42.4	.41	14	7417
V1118	106.9	3580	2780	11583	3113	31.0	4474	45.0	.39	16	7823
V1119	111.7	3739	2903	12096	3251	32.5	4691	47.7	.38	16	8231
V1120	118.2	3957	3072	12800	3441	34.5	4979	50.3	.38	16	8638
V1121	124.7	4174	3241	13504	3630	36.5	5268	53.0	.40	16	9053
V1122	129.5	4334	3365	14021	3769	38.0	5485	55.6	.41	18	9456
V1123	136.0	4551	3533	14721	3957	40.0	5733	58.3	.43	18	9865

1. Suffix "S" indicates steam boiler, "W" indicates water boiler. Suffix "G" indicates gas-fired, "O" indicates oil fired and "GO" indicates combination gas/oil fired.
2. Boiler ratings are based on 13% CO₂ on oil; 10.0% CO₂ on gas, and + .10 in. water column pressure at boiler flue outlet.
3. I=B=R net ratings shown are based on piping and pick up allowances which vary from 1.333 to 1.288 for steam and 1.15 for water. Consult manufacturer for installations having unusual piping and pick up requirements, such as intermittent system operation, extensive piping systems, etc.
4. The I=B=R burner capacity in GPH is based on oil having a heat value of 140,000 BTU per gallon.

Ratings shown above apply to altitudes up to 1000 feet for oil and 2000 feet for gas. For altitudes above those indicated, the ratings should be reduced at the rate of 4% for each 1000 feet above sea level.

NOTE: Maximum allowable working pressure (MAWP):
 Steam: 15 PSI
 Water – USA: 80 PSI (Standard relief valve provided is 50 PSI) (80 PSI/30 PSI Optional)
 Water – Canada: 50 PSI (Standard relief valve provided is 50 PSI) (30 PSI Optional)

STANDARD EQUIPMENT

ALL BOILERS: Sections unassembled, flush insulated jacket, burner mounting plate, rear observation port cover, fire wall plates, target wall (V1104-1106 only), rear flue outlet damper (top outlet optional), flue canopy, trim, and miscellaneous plugs, bushing and fittings

STEAM TRIM: 15 PSI safety valve, L404F pressure/retrol, gauge glass assembly, steam gauge

WATER TRIM: 50 PSI safety relief valve, L4006A high limit, pressure temperature gauge

OIL BOILERS: Flange mounted flame retention oil burner furnished with 2 stage fuel unit, primary control and dual oil valves

GAS BOILERS: Flange mounted gas burner with standard controls meeting the latest UL requirements, dual gas valves, gas-electric ignition with proven gas pilot, flame rod on JR burner, ultra violet flame detector on others, electronic programming controls and components are factory wired in a burner mounted control panel (except JR - panel available as an option)

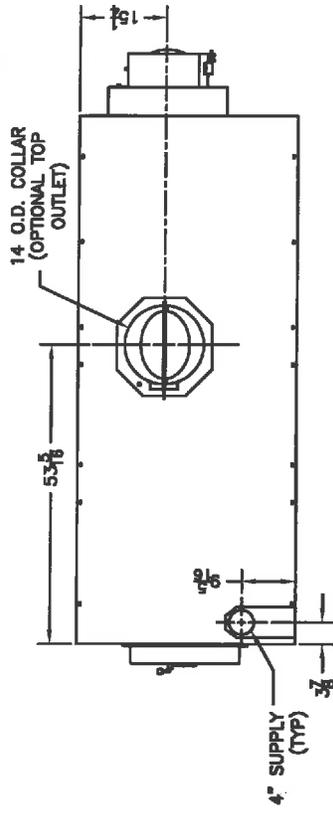
GAS/OIL BURNERS: Flange mounted combination gas/oil burner with standard controls meeting latest UL requirements, manually operated fuel transfer switch for dual fuel changeover, dual gas valves and oil valves, electric ignition with proven gas pilot on both fuels (direct spark ignition of oil is optional), ultra-violet flame detector, electronic programming controls and components are factory wired in a burner mounted control panel

OPTIONAL EQUIPMENT

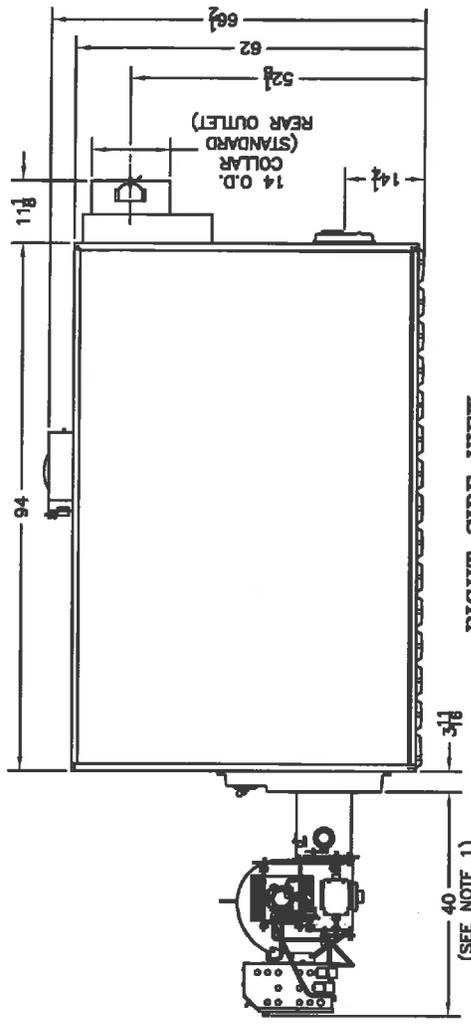
Assembled sections; completely packaged (includes manual reset high limit and manual reset low water cutoff); packaged and fire-tested; top outlet flue damper; tankless heaters; side inspection tapplings with brass plugs; pressure relief door; 30 PSI and 80 PSI safety relief valves; combustion and hydronic controls to meet special applications including F.M., I.R.I., and ASME CSD-1.



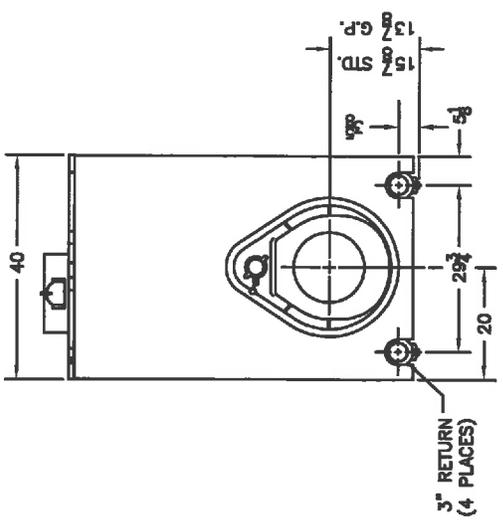
Burnham Commercial - Lancaster, PA
 Phone: 1-888-791-3790
 www.burnhamcommercial.com



TOP VIEW



RIGHT SIDE VIEW
(BURNER INSTALLED)



FRONT VIEW

- NOTES:
1. TYPICAL POWER FLAME 'CR' BURNER LENGTH SHOWN. EXACT BURNER DIMENSIONS MAY VARY.
 2. SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

DIMENSIONS IN INCHES, FRACTIONAL TOLERANCES ±1/32", ANGULAR TOLERANCES ±1', UNLESS OTHERWISE NOTED.		SUPERSEDES		DWG. DATE 12/22/08
DRAWING TITLE DIMENSIONAL DRAWING V1115 WATER BOILER 20°F OR 40°F TEMPERATURE RISE		DRAWING NO. TS-93-75-B		REV. LEVEL
DRAWN EAB	CHECKED	DESIGNED	APPROVED MZ	DWG. SCALE 3/64"=1"
			RELEASED	