



DISPLAY THIS CARD ON PRINCIPAL FRONTAGE OF WORK

CITY OF PORTLAND BUILDING PERMIT



This is to certify that ALISON A DENHAM

Located At 105 WEST ST

Job ID: 2012-01-3096-ALTR

CBL: 063-A-014-001

has permission to Install Heater

provided that the person or persons, firm or corporation accepting this permit shall comply with all of the provisions of the Statues of Maine and of the Ordinances of the City of Portland regulating the construction, maintenance and use of the buildings and structures, and of the application on file in the department.

Notification of inspection and written permission procured before this building or part thereof is lathed or otherwise closed-in. 48 HOUR NOTICE IS REQUIRED.

A final inspection must be completed by owner before this building or part thereof is occupied. If a certificate of occupancy is required, it must be

Fire Prevention Officer

Code Enforcement Officer / Plan Reviewer

THIS CARD MUST BE POSTED ON THE STREET SIDE OF THE PROPERTY
PENALTY FOR REMOVING THIS CARD



PORTLAND MAINE

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Director of Planning and Urban Development
Penny St. Louis

Job ID: 2012-01-3096-ALTR

Located At: 105 WEST ST

CBL: 063- A-014-001

Conditions of Approval:

Zoning

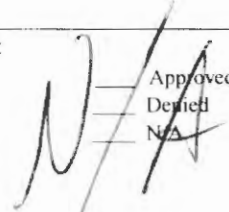
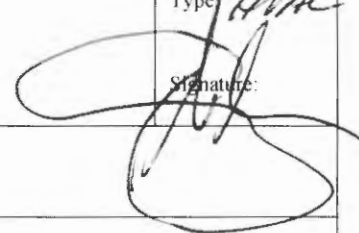
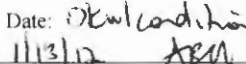
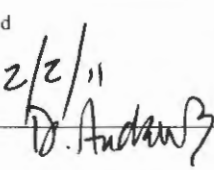
1. ANY exterior work requires a separate review and approval thru Historic Preservation. This property is located within an Historic District.
2. This property shall remain a two family dwelling. Any change of use shall require a separate permit application for review and approval.

Historic

* Approved with the understanding that any exterior meters or regulators associated with the service will be located away from the front façade and front corners of the house. If this is not the case, contractor must seek approval from Historic Preservation staff.

City of Portland, Maine - Building or Use Permit Application

389 Congress Street, 04101 Tel: (207) 874-8703, FAX: (207) 8716

Job No: 2012-01-3096-ALTR	Date Applied: 1/13/2012	CBL: 063- A-014-001		
Location of Construction: 105 WEST ST	Owner Name: ALISON A DENHAM	Owner Address: 105 WEST ST PORTLAND, ME 04102	Phone:	
Business Name:	Contractor Name: Caron & Waltz	Contractor Address: 321 Lincoln ST SOUTH PORTLAND ME 04106	Phone: (207) - 799-2228	
Lessee/Buyer's Name:	Phone:	Permit Type: HVAC - HVAC	Zone: R-4	
Past Use: Two family	Proposed Use: Same -Two family – install gas boiler in the basement	Cost of Work: 17000.00	CEO District:	
		Fire Dept: <div style="text-align: center;">Approved Denied N/A</div>	Inspection: Use Group: C Type: HVAC	
		Signature: 	Signature: 	
Proposed Project Description: Install of Heater by Caron & Waltz		Pedestrian Activities District (P.A.D.)		
Permit Taken By:		Zoning Approval		
<div>1. This permit application does not preclude the Applicant(s) from meeting applicable State and Federal Rules.</div> <div>2. Building Permits do not include plumbing, septic or electrical work.</div> <div>3. Building permits are void if work is not started within six (6) months of the date of issuance. False informatin may invalidate a building permit and stop all work.</div>		Special Zone or Reviews	Zoning Appeal	Historic Preservation
		<div><input type="checkbox"/> Shoreland</div> <div><input type="checkbox"/> Wetlands</div> <div><input type="checkbox"/> Flood Zone</div> <div><input type="checkbox"/> Subdivision</div> <div><input type="checkbox"/> Site Plan</div> <div> </div> <div><input type="checkbox"/> Maj <input type="checkbox"/> Min <input type="checkbox"/> MM</div> <div>Date: OK w/ conditions 1/13/12 </div>	<div><input type="checkbox"/> Variance</div> <div><input type="checkbox"/> Miscellaneous</div> <div><input type="checkbox"/> Conditional Use</div> <div><input type="checkbox"/> Interpretation</div> <div><input type="checkbox"/> Approved</div> <div><input type="checkbox"/> Denied</div> <div> </div> <div>Date:</div>	<div><input type="checkbox"/> Not in Dist or Landmark</div> <div><input type="checkbox"/> Does not Require Review</div> <div><input type="checkbox"/> Requires Review</div> <div><input checked="" type="checkbox"/> Approved</div> <div><input checked="" type="checkbox"/> Approved w/Conditions</div> <div><input type="checkbox"/> Denied</div> <div> </div> <div>Date: 2/2/11 </div>
CERTIFICATION				

I hereby certify that I am the owner of record of the named property, or that the proposed work is authorized by the owner of record and that I have been authorized by the owner to make this application as his authorized agent and I agree to conform to all applicable laws of this jurisdiction. In addition, if a permit for work described in the application is issued, I certify that the code official's authorized representative shall have the authority to enter all areas covered by such permit at any reasonable hour to enforce the provision of the code(s) applicable to such permit.

SIGNATURE OF APPLICANT

ADDRESS

DATE

PHONE

RESPONSIBLE PERSON IN CHARGE OF WORK, TITLE

DATE

PHONE



R4, hispic.

FILL IN AND SIGN WITH INK

APPLICATION FOR PERMIT HEATING OR POWER EQUIPMENT

To the INSPECTOR OF BUILDINGS, PORTLAND, ME.

The undersigned hereby applies for a permit to install the following heating, cooking or power equipment in accordance with the Laws of Maine, the Building Code of the City of Portland, and the following specifications:

Location / CBL 105 WEST STREET Use of Building RESIDENTIAL Date 1/12/12
 Name and address of owner of appliance Alison Denham, 105 West Street, Portland, ME 04102

Installer's name and address CARON + WALTZ, 321 LINCOLN STREET, So. Portland, ME 04106
 Telephone 799-2228

Location of appliance:

- ☒ Basement ☐ Floor
☐ Attic ☐ Roof

Type of Fuel:

- ☒ Gas ☐ Oil ☐ Solid

Appliance Name: LOCHINVAR KNIGHT KBN211U.L. Approved ☐ Yes ☐ No

Will appliance be installed in accordance with the manufacture's installation instructions? ☒ Yes ☐ No

IF NO Explain: _____

The Type of License of Installer:

- ☐ Master Plumber # _____
☐ Solid Fuel # _____
☐ Oil # _____
☐ Gas # PNT1619
☐ Other _____

Type of Chimney:

- ☐ Masonry Lincol
 Factory built _____

- ☐ Metal
 Factory Built U.L. Listing # _____

☒ Direct Vent
 Type PVC UL# _____

Type of Fuel Tank

- ☐ Oil N/A (NATURAL GAS)
☐ Gas

Size of Tank N/ANumber of Tanks N/ADistance from Tank to Center of Flame N/A feet.Cost of Work: \$ 16,530Permit Fee: \$ 190

Approved

Fire: _____

Ele.: _____

Bldg.: _____

Signature of Installer [Signature]

Approved with Conditions

- ☐ See attached letter or requirement

Inspector's Signature _____

RECEIVED Approved

White - Inspection

Yellow - File

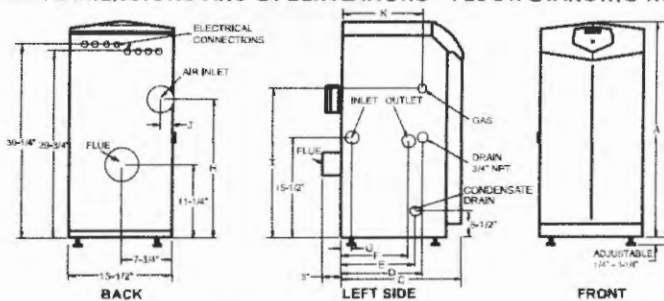
Pink - Applicant's

Gold - Assessor's Copy

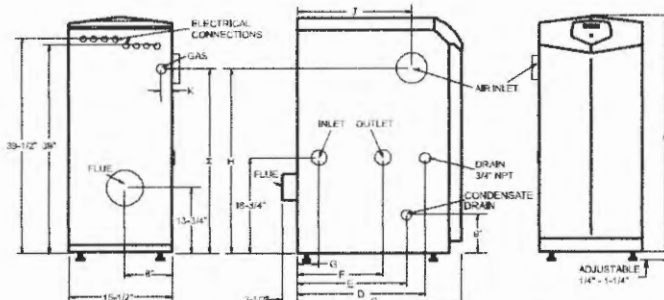
JAN 13 2012
 Dept. of Building Inspections
 City of Portland Maine

KNIGHT® BOILER DIMENSIONS AND SPECIFICATIONS - FLOOR-STANDING MODELS

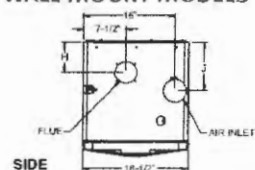
Models:
KBN 081-211



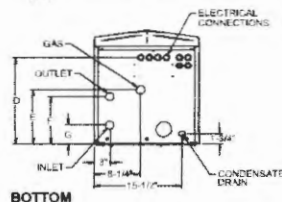
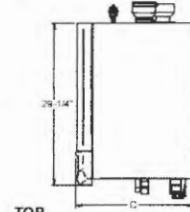
Model:
KBN286



WALL-MOUNT MODELS



Models:
WBN051-211



KNIGHT HEATING BOILER

Model Number	Input Min. MBH	Input Max. MBH	AFUE %	Heating Capacity MBH	NET I=B+R MBH
WBN051	10	50	95.3	45	39
WBN081	16	80	95.3	72	63
WBN106	21	105	95.4	94	82
WBN151	30	150	95.5	135	119
WBN211	42	210	95.7	190	165
KBN081	16	80	95.3	72	63
KBN106	21	105	95.4	94	82
KBN151	30	150	95.5	135	119
KBN211	42	210	95.7	190	165
KBN286	57	285	96.0	260	226

DIMENSIONS AND SPECIFICATIONS

A	C	D	E	F	G	H	I	J	K	M	Gas Conn.	Water Conn.	Air Inlet	Vent Size	Shipping Wt. (lbs.)
29-1/4"	15-3/4"	NA	10-3/4"	10-3/4"	2"	6-3/4"	NA	3-1/4"	4-1/4"	2-3/4"	1/2"	1"	2"	2"	130
29-1/4"	15-3/4"	NA	10-3/4"	10-3/4"	2"	6-3/4"	NA	3-1/4"	4-1/4"	2-3/4"	1/2"	1"	2"	2"	130
29-1/4"	15-3/4"	NA	10-3/4"	10-3/4"	3-1/2"	5-1/2"	NA	3-1/4"	4-1/4"	2-3/4"	1/2"	1"	2"	2"	134
29-1/4"	20-3/4"	NA	15-3/4"	8-1/2"	3-1/2"	5-1/2"	NA	8-3/4"	9-3/4"	1-1/2"	1/2"	1"	3"	3"	162
29-1/4"	25"	NA	20"	12"	3-1/2"	5-1/2"	NA	13"	14"	1-1/2"	1/2"	1"	3"	3"	177
33-1/4"	14"	7"	5-3/4"	5"	3"	20-1/2"	22"	1-3/4"	6-1/2"	NA	1/2"	1"	3"	3"	125
33-1/4"	14"	6-1/2"	5-3/4"	4-1/2"	1-1/2"	20-1/2"	22"	1-3/4"	6-1/2"	NA	1/2"	1"	3"	3"	129
33-1/4"	18"	12-1/4"	11-1/2"	10"	1-3/8"	21-1/4"	23"	1-3/4"	12"	NA	1/2"	1"	3"	3"	157
33-1/4"	22-1/4"	16-1/2"	15-3/4"	14-1/4"	5-1/4"	21-1/4"	23"	1-3/4"	16-1/4"	NA	1/2"	1"	3"	3"	172
42-1/4"	19-3/4"	12-3/4"	13-1/2"	6"	2"	34"	31"	11-3/4"	4-1/4"	NA	3/4"	1-1/4"	4"	4"	224

Notes: Indoor installation only. All information subject to change. Change "N" to "L" for LP gas models.

SMART SYSTEM™ FEATURES

- SMART SYSTEM Digital Operating Control
 - Multi-Color Graphic LCD Display with Navigation Dial and Soft Keys
 - Three Setpoint Temperature Inputs
 - Built-in Cascading Sequencer for up to 8 Boilers
 - Lead Lag
 - Efficiency Optimization
 - Outdoor Reset Control with Outdoor Air Sensor
 - Programmable for Three Reset Temperature Inputs
 - Programmable System Efficiency Optimizers
 - Night Setback w/Override Function
 - DHW Night Setback w/Override Function
 - Anti-Cycling
 - Outdoor Air Reset Curve
 - Ramp Delay
 - Boost Temperature & Time
 - Three Pump Control
 - System Pump with Parameter for Continuous Operation
 - Boiler Pump with Variable Speed Pump Control*
 - Domestic Hot Water Pump
 - Domestic Hot Water Prioritization
 - DHW tank piped with priority in the boiler loop
 - DHW tank piped as a zone in the system with the pumps controlled by the Smart System
 - DHW Modulation Limiting
 - Separately Adjustable SH/DHW Switching Times*
 - Building Management System Integration
 - 0-10VDC Input to Control Modulation or Set Point
 - 0-10VDC Modulation Rate Output
 - 0-10VDC Input Signal from Variable Speed System Pump*
 - 0-10VDC Input to Enable/Disable call for heat
- *Exclusive feature, available only from Lochinvar
- High-Voltage Terminal Strip
 - 120 VAC / 60 Hertz / 1 Phase Power Supply
 - Three Sets of Pump Contacts
 - Low Voltage Terminal Strip
 - 24 VAC Device Relay
 - Proving Switch Contacts
 - Flow Switch Contacts
 - Alarm on Any Failure Contacts
 - Runtime Contacts
 - DHW Thermostat Contacts
 - 3 Space Heat Thermostat Contacts
 - System Sensor Contacts
 - DHW Tank Sensor Contacts
 - Outdoor Air Sensor Contacts
 - Cascade Contacts
 - 0-10VDC BMS External Control Contact
 - 0-10VDC Boiler Rate Output Contacts
 - 0-10VDC Variable Speed System Pump Signal Input
 - 0-10VDC Signal to Control Variable Speed Boiler Pump
 - Modbus Contacts
 - Time Clock
 - Data Logging
 - Hours Running, Space Heating
 - Hours Running, Domestic Hot Water
 - Ignition Attempts
 - Last 10 Lockouts
 - Access to BMS Settings through Graphic LCD Display
 - Maintenance Reminder
 - Custom Maintenance Reminder with Contractor Info
 - Installer Ability to De-activate Service Reminder
 - Low-Water Flow Safety Control & Indication
 - Dual Level Password Security
 - Customizable Freeze Protection Parameters

STANDARD FEATURES

- Energy Star™ Qualified
- Up to 96% DOE AFUE Efficiency
- Modulating Burner with 5:1 Turndown
 - Direct-Spark Ignition
 - Low-NOx Operation
 - Field Convertible from Natural to LP Gas
- ASME Stainless Steel Heat Exchanger
 - 30 psi ASME Relief Valve
- Vertical & Horizontal Direct-Vent
 - PVC, CPVC or SS Venting up to 100 feet
 - Factory Supplied Sidewall Vent Termination
- Smart System Control
- Condensate Trap
- Other Features
 - Automatic Reset High Limit
 - Adjustable High Limit w/Manual Reset
 - Boiler Circulating Pump
 - Adjustable Leveling Legs (KB Models only)
 - Wall-Mount Bracket (WB Models only)
 - Zero Clearances to Combustible Materials
 - 12-Year Limited Warranty (See Warranty for Details)

OPTIONAL EQUIPMENT

- Modbus Communication
- Condensate Neutralization Kit
- Flow Switch
- Low-Water Cutoff w/Manual Reset & Test
- Alarm Bell
- Concentric Vent Kit
- SMART SYSTEM PC Software
- Stack Frame

FIRING CODES

- M9 Standard Construction
- M7 California Code



Patent Pending



Lochinvar®
High Efficiency Water Heaters, Boilers and Pool Heaters

300 Maddox Simpson Parkway, Lebanon, TN 37090 | 615-889-8900 | fax: 615-547-1000 | www.Lochinvar.com

1 Determine boiler location

Installation must comply with:

- Local, state, provincial, and national codes, laws, regulations, and ordinances.
- National Fuel Gas Code, ANSI Z223.1 – latest edition.
- Standard for Controls and Safety Devices for Automatically Fired Boilers, ANSI/ASME CSD-1, when required.
- National Electrical Code.
- For Canada only: B149.1 Installation Code, CSA C22.1 Canadian Electrical Code Part 1 and any local codes.

NOTICE

The Knight boiler gas manifold and controls met safe lighting and other performance criteria when the boiler underwent tests specified in ANSI Z21.13 – latest edition.

Before locating the boiler, check:

1. Check for nearby connection to:
 - System water piping
 - Venting connections
 - Gas supply piping
 - Electrical power
2. Locate the appliance so that if water connections should leak, water damage will not occur. When such locations cannot be avoided, it is recommended that a suitable drain pan, adequately drained, be installed under the appliance. The pan must not restrict combustion air flow. Under no circumstances is the manufacturer to be held responsible for water damage in connection with this appliance, or any of its components.
3. Check area around the boiler. Remove any combustible materials, gasoline and other flammable liquids.

WARNING

Failure to keep boiler area clear and free of combustible materials, gasoline, and other flammable liquids and vapors can result in severe personal injury, death, or substantial property damage.

4. The Knight boiler must be installed so that gas control system components are protected from dripping or spraying water or rain during operation or service.
5. If a new boiler will replace an existing boiler, check for and correct system problems, such as:
 - System leaks causing oxygen corrosion or heat exchanger cracks from hard water deposits.
 - Incorrectly-sized expansion tank.
 - Lack of freeze protection in boiler water causing system and boiler to freeze and leak.

WARNING

This appliance is certified as an indoor appliance. Do not install the appliance outdoors or locate where the appliance will be exposed to freezing temperatures or to temperatures that exceed 100°F.

Do not install the appliance where the relative humidity may exceed 93%. Do not install the appliance where condensation may form on the inside or outside of the appliance, or where condensation may fall onto the appliance.

Failure to install the appliance indoors could result in severe personal injury, death, or substantial property damage.

WARNING

This appliance requires a special venting system. If using PVC the vent connection to the appliance must be made with the starter CPVC pipe section provided with the appliance. The field provided vent fittings must be cemented to the CPVC pipe section. Use only the vent materials, primer and cement specified in this manual to make the vent connections. Failure to follow this warning could result in fire, personal injury, or death.

Closet and alcove installations

A closet is any room the boiler is installed in which is less than 67 cubic feet for KBN081 and KBN106 models, 86 cubic feet for KBN151 models, 107 cubic feet for KBN211 models, and 120 cubic feet for KBN286 models.

An alcove is any room which meets the criteria for a closet with the exception that it does not have a door.

Example: Room dimensions = 4 feet long, 3 feet wide, and 8 foot ceiling = 4 x 3 x 8 = 96 cubic feet. This would be considered a closet for a Knight Boiler.

WARNING

For closet and alcove installations as shown in FIG.'s 1-1 and 1-2, CPVC, polypropylene or stainless steel vent material must be used inside the structure. The ventilating air openings shown in FIG.'s 1-1 and 1-2 are required for this arrangement. Failure to follow this warning could result in fire, personal injury, or death.

Provide clearances:

Clearances from combustible materials

1. Hot water pipes—at least 1/4" (6 mm) from combustible materials.
2. Vent pipe – at least 1" (25 mm) from combustible materials.
3. See FIG.'s 1-1 and 1-2 on page 9 for other clearance minimums.

Clearances for service access

1. See FIG.'s 1-1 and 1-2 on page 9 for recommended service clearances. If you do not provide the minimum clearances shown, it may not be possible to service the boiler without removing it from the space.

3 General venting

Direct venting options - Sidewall Vent

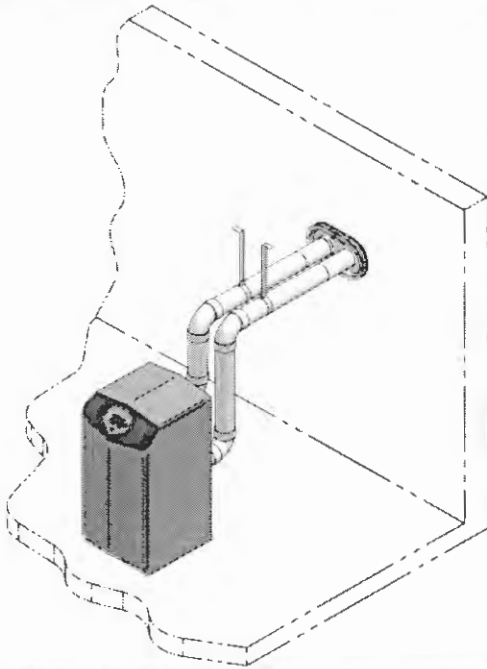


Figure 3-1 PVC/CPVC Two-Pipe Sidewall Termination - See page 21 for more details

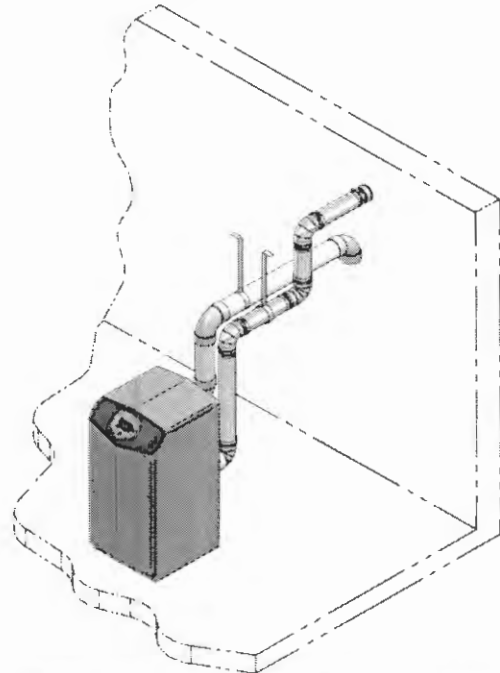


Figure 3-2 Stainless Steel Two-Pipe - See page 22 for more details

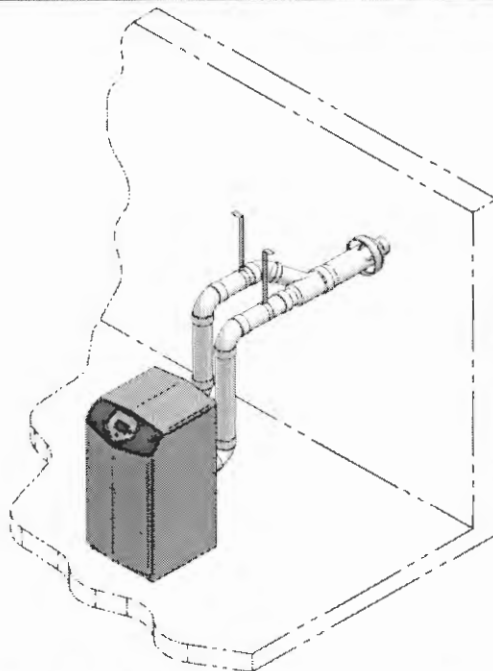


Figure 3-3 PVC/CPVC Concentric Sidewall Termination - See page 25 for more details

3 General venting (continued)

Direct venting options - Vertical Vent

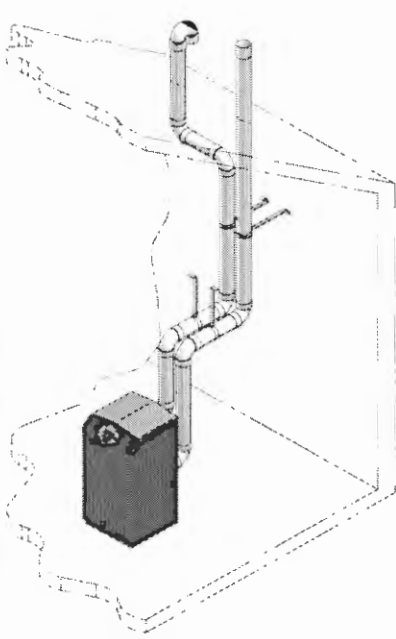


Figure 3-4 PVC/CPVC Two-Pipe Vertical Termination - See page 28 for more details

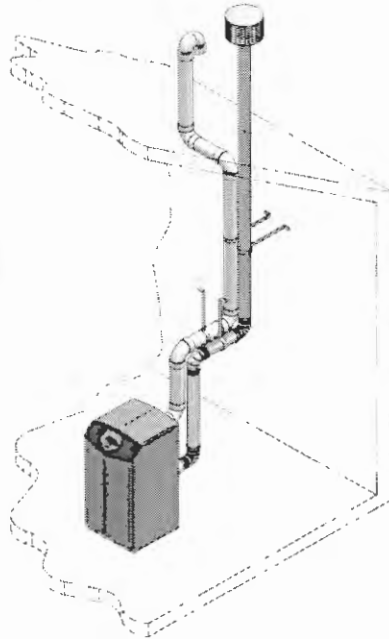


Figure 3-5 Stainless Steel Two-Pipe Vertical Termination - See page 28 for more details

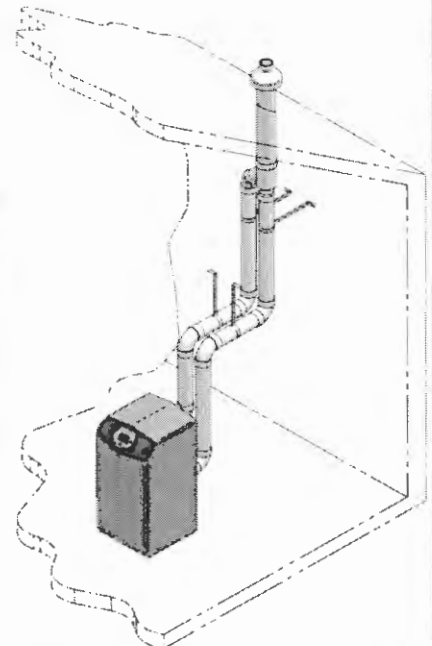


Figure 3-6 PVC/CPVC Concentric Vertical Termination - See page 30 for more details

Direct venting options - Vertical Vent, Sidewall Air

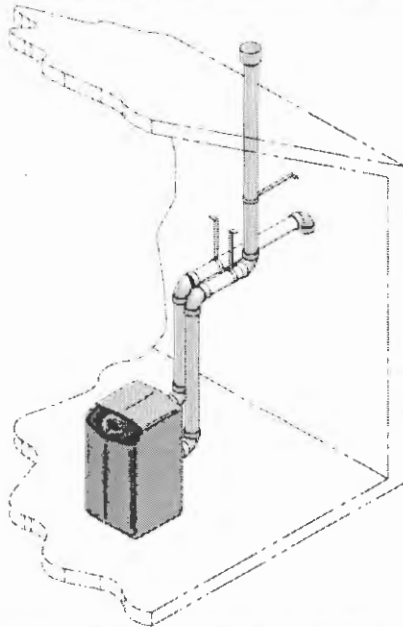


Figure 3-7 PVC/CPVC Vertical Vent, Sidewall Air - See page 20 for more details

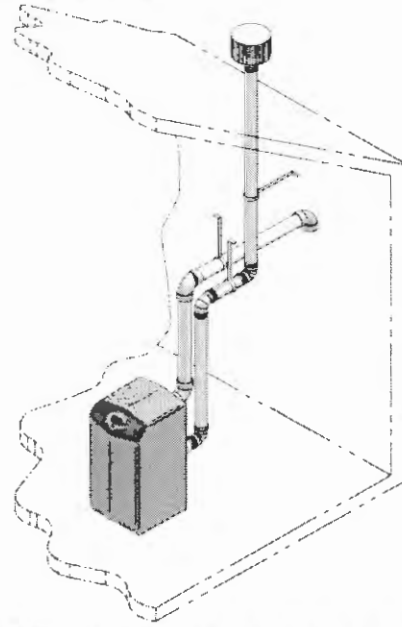


Figure 3-8 Stainless Steel Vertical Vent, Sidewall Air - See page 20 for more details

NOTICE

Stainless steel vent/air design and terminations will vary slightly by manufacturer.

3 General venting

Install vent and combustion air piping

⚠ DANGER

The Knight boiler must be vented and supplied with combustion and ventilation air as described in this section. Ensure the vent and air piping and the combustion air supply comply with these instructions regarding vent system, air system, and combustion air quality. See also Section 1 of this manual.

Inspect finished vent and air piping thoroughly to ensure all are airtight and comply with the instructions provided and with all requirements of applicable codes.

Failure to provide a properly installed vent and air system will cause severe personal injury or death.

PVC/CPVC vent piping materials

⚠ WARNING

Use only the materials listed in Table 3A for vent pipe, and fittings. Failure to comply could result in severe personal injury, death, or substantial property damage.

NOTICE

Installation must comply with local requirements and with the National Fuel Gas Code, ANSI Z223.1 for U.S. installations or CSA B149.1 for Canadian installations.

⚠ WARNING

For closet and alcove installations, CPVC or stainless steel material **MUST BE** used in a closet/alcove structure. Failure to follow this warning could result in fire, personal injury, or death.

NOTICE

All PVC vent pipes must be glued, properly supported, and the exhaust must be pitched a minimum of a 1/4 inch per foot back to the boiler (to allow drainage of condensate).

⚠ WARNING

This appliance requires a special venting system. The vent connection to the appliance must be made with the starter CPVC pipe section provided with the appliance if PVC/CPVC vent is to be used. For stainless steel venting use an adapter from Table 3B (page 19) that corresponds with the intended vent manufacturer to be used and discard the CPVC starter piece. The field provided vent fittings must be cemented to the CPVC pipe section using an "All Purpose Cement" suitable for PVC and CPVC pipe. Use only the vent materials, primer, and cement specified in this manual to make the vent connections. Failure to follow this warning could result in fire, personal injury, or death.

⚠ WARNING

Insulation should not be used on PVC or CPVC venting materials. The use of insulation will cause increased vent wall temperatures, which could result in vent pipe failure.

Requirements for installation in Canada

1. Installations must be made with a vent pipe system certified to ULC-S636.
IPEX is an approved vent manufacturer in Canada supplying vent material listed to ULC-S636.
2. The first three (3) feet of plastic vent pipe from the appliance flue outlet must be readily accessible for visual inspection.
3. The components of the certified vent system must not be interchanged with other vent systems or unlisted pipe/fittings. For concentric vent installations, the inner vent tube must be replaced with field supplied certified vent material to comply with this requirement.
4. The 3" Concentric Vent Kit available from Lochinvar (see Section 4 – *Sidewall Termination – Optional Concentric Vent*) and the 3" Concentric Vent Kit available from IPEX are both approved for use on the Knight boiler. Both kits are listed to the ULC-S636 standard for use in Canada.

⚠ CAUTION

Improper installation of PVC or CPVC systems may result in injury or death.

Installing vent and air piping

NOTICE

Use only cleaners, primers, and solvents that are approved for the materials which are joined together.

1. Work from the boiler to vent or air termination. Do not exceed the lengths given in this manual for the air or vent piping.
2. Cut pipe to the required lengths and deburr the inside and outside of the pipe ends.
3. Chamfer outside of each pipe end to ensure even cement distribution when joining.
4. Clean all pipe ends and fittings using a clean dry rag. (Moisture will retard curing and dirt or grease will prevent adhesion.)
5. Dry fit vent or air piping to ensure proper fit up before assembling any joint. The pipe should go a third to two-thirds into the fitting to ensure proper sealing after cement is applied.

3 General venting *(continued)*

6. Priming and Cementing:
 - a. Handle fittings and pipes carefully to prevent contamination of surfaces.
 - b. Apply a liberal even coat of primer to the fitting socket.
 - c. Apply a liberal even coat of primer to the pipe end to approximately 1/2" beyond the socket depth.
 - d. Apply a second primer coat to the fitting socket.
 - e. While primer is still wet, apply an even coat of approved cement to the pipe equal to the depth of the fitting socket.
 - f. While primer is still wet, apply an even coat of approved cement to the fitting socket.
 - g. Apply a second coat of cement to the pipe.
 - h. While the cement is still wet, insert the pipe into the fitting, if possible twist the pipe a 1/4 turn as you insert it. **NOTE:** If voids are present, sufficient cement was not applied and joint could be defective.
 - i. Wipe excess cement from the joint removing ring or beads as it will needlessly soften the pipe.

Table 3A Vent Pipe, and Fittings

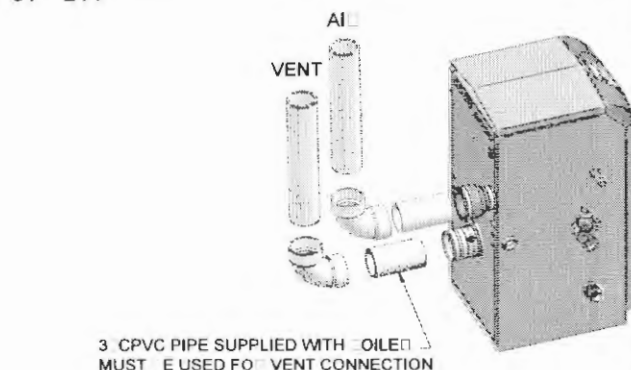
All vent pipe materials and fittings must comply with the following:			
Item	Material	Standards for installation in:	
		United States	Canada
Vent pipe and fittings	PVC Plastic Pipe, Schedules 40, 80, & 120	ANSI/ASTM D1785	CPVC and PVC venting must be ULC-S636 Certified. IPEX is an approved manufacturer in Canada supplying vent material listed to ULC-S636.
	PVC Plastic Pipe Fittings, Schedule 40	ANSI/ASTM D2466	
	PVC Plastic Pipe Fittings, Schedule 80	ANSI/ASTM D2467	
	PVC - DWV Pipe and Fittings	ANSI/ASTM D2665	
	CPVC Plastic Pipe, Schedule 40 & 80	ANSI/ASTM F441	
	CPVC Plastic Pipe Fittings, Schedule 80	ANSI/ASTM F439	
	AL29-4C	UL1738	ULC-S636
NOTICE: DO NOT USE CELLULAR (FOAM) CORE PIPE			
Approved Stainless Steel Vent Manufacturers			
Make		Model	
ProTech Systems (Simpson Dura-Vent Co.)		FasNSeal Vent / FasNSeal Flex* Vent	
Z-Flex (Nova Flex Group)		Z-Vent	
Heat Fab (Selkirk Corporation)		Saf-T Vent	

*Use of FasNSeal Flex smooth inner wall vent is to be used in vertical or near vertical sections only, taking precaution to ensure no sagging occurs of the vent system. Connect to the FasNSeal rigid vent using specially designed adapters and sealing method, see manufacturer's instructions.

PVC/CPVC air intake/vent connections

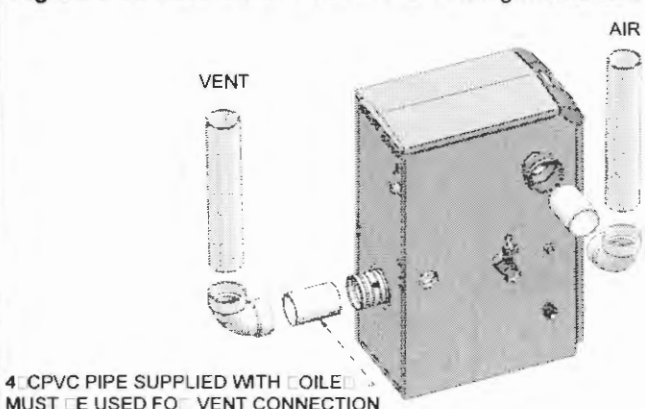
1. **Combustion Air Intake Connector** (FIG.'s 3-9 and 3-10) - Used to provide combustion air directly to the unit from outdoors. A fitting is provided on the unit for final connection. Combustion air piping must be supported per guidelines listed in the National Mechanical Code, Section 305, Table 305.4 or as local codes dictate.
2. **Vent Connector** (FIG.'s 3-9 and 3-10) - Used to provide a passageway for conveying combustion gases to the outside. A transition fitting is provided on the unit for final connection. Vent piping must be supported per the National Building Code, Section 305, Table 305.4 or as local codes dictate.

Figure 3-9 Near Boiler PVC/CPVC Venting Models 81 - 211



NOTE: CPVC VENT PIPE AND VENT FITTINGS MUST BE USED IN CLOSET AND ALCOVE INSTALLATIONS.

Figure 3-10 Near Boiler PVC/CPVC Venting Model 286



NOTE: CPVC VENT PIPE AND VENT FITTINGS MUST BE USED IN CLOSET AND ALCOVE INSTALLATIONS.

3 General venting

Air inlet pipe materials:

The air inlet pipe(s) must be sealed. Choose acceptable combustion air inlet pipe materials from the following list:

PVC, CPVC or ABS

Dryer Vent or Sealed Flexible Duct (not recommended for rooftop air inlet)

Galvanized steel vent pipe with joints and seams sealed as specified in this section.

Type "B" double-wall vent with joints and seams sealed as specified in this section.

AL29-4C, stainless steel material to be sealed to specification of its manufacturer.

*Plastic pipe may require an adapter (not provided) to transition between the air inlet connection on the appliance and the plastic air inlet pipe.

⚠ WARNING

Using vent or air intake materials other than those specified, failure to properly seal all seams and joints or failure to follow vent pipe manufacturer's instructions can result in personal injury, death or property damage. Mixing of venting materials will void the warranty and certification of the appliance.

NOTICE

The use of double-wall vent or insulated material for the combustion air inlet pipe is recommended in cold climates to prevent the condensation of airborne moisture in the incoming combustion air.

Sealing of Type "B" double-wall vent material or galvanized vent pipe material used for air inlet piping on a sidewall or vertical rooftop Combustion Air Supply System:

- Seal all joints and seams of the air inlet pipe using either Aluminum Foil Duct Tape meeting UL Standard 723 or 181A-P or a high quality UL Listed silicone sealant such as those manufactured by Dow Corning or General Electric.
- Do not install seams of vent pipe on the bottom of horizontal runs.
- Secure all joints with a minimum of three sheet metal screws or pop rivets. Apply Aluminum Foil Duct Tape or silicone sealant to all screws or rivets installed in the vent pipe.
- Ensure that the air inlet pipes are properly supported.

The PVC, CPVC, or ABS air inlet pipe should be cleaned and sealed with the pipe manufacturer's recommended solvents and standard commercial pipe cement for the material used. The PVC, CPVC, ABS, Dryer Vent or Flex Duct air inlet pipe should use a silicone sealant to ensure a proper seal at the appliance connection and the air inlet cap connection. Dryer vent or flex duct should use a screw type clamp to seal the vent to the appliance air inlet and the air inlet cap. Proper sealing of the air inlet pipe ensures that combustion air will be free of contaminants and supplied in proper volume.

When a sidewall or vertical rooftop combustion air supply system is disconnected for any reason, the air inlet pipe must be resealed to ensure that combustion air will be free of contaminants and supplied in proper volume.

⚠ DANGER

Failure to properly seal all joints and seams as required in the air inlet piping may result in flue gas recirculation, spillage of flue products and carbon monoxide emissions causing severe personal injury or death.

Stainless steel vent

This product has been approved for use with stainless steel using the manufacturers listed in Table 3A.

⚠ WARNING

Use only the materials, vent systems, and terminations listed in Table 3B. DO NOT mix vent systems of different types or manufacturers, unless listed in this manual. Failure to comply could result in severe personal injury, death, or substantial property damage.

NOTICE

Installations must comply with applicable national, state, and local codes. Stainless steel vent systems must be listed as a UL-1738 approved system for the United States and a ULC-S636 approved system for Canada.

NOTICE

Installation of a stainless steel vent system should adhere to the stainless steel vent manufacturer's installation instructions supplied with the vent system.

NOTICE

The installer must use a specific vent starter adapter at the flue collar connection, supplied by the vent manufacturer to adapt to its vent system. See Table 3B for approved vent adapters. Discard CPVC starter piece.

3 General venting *(continued)*

Stainless steel air intake/vent connections

1. **Combustion Air Intake Connector** (FIG. 3-11) - Used to provide combustion air directly to the unit from outdoors. A fitting is provided on the unit for final connection. Combustion air piping must be supported per guidelines listed in the National Mechanical Code, Section 305, Table 305.4 or as local codes dictate.
2. **Vent Connector** (FIG. 3-11) - Used to provide a passageway for conveying combustion gases to the outside. A transition fitting is provided on the unit for final connection. Vent piping must be supported per the National Building Code, Section 305, Table 305.4 or as local codes dictate.

Figure 3-11 Near Boiler Stainless Steel Venting Model 286

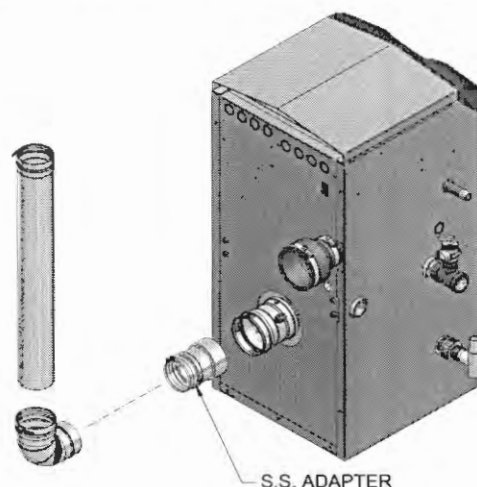


Table 3B Approved Stainless Steel Terminations and Adapters

Model	ProTech			Heat Fab				Z Flex		
	FasNSeal			Saf-T Vent				Z-Vent		
	Boiler Adapter	Flue Termination	Intake Air Termination	Boiler Adapter	Intermediate Adapter	Flue Termination	Intake Air Termination	Boiler Adapter	Flue Termination	Intake Air Termination
81 - 211	300715	FSBS3 FSRC3(R.C)	303889	KB80210	9353BUREZ-1*	9392 5300CI	9314TERM	2SVSLA03	2SVSTP03 2SVSRCX03	2SVSTEX0390
286	F303759	FSBS4 FSRC4(R.C.)	FSAIH04 303888	KB285600	9454BUREZ-1*	9492 5400CI	9414TERM	2SVSLA04	2SVSTP04 2SVSRCX04	2SVSTEX0490

* = This adapter must be used in addition to the boiler adapter for Saf-T vent pipe as shown in FIG. 3-11, unless approved vent other than standard diameter is used. Consult a Heat Fab representative for questions.

The Knight boiler uses model specific combustion air intake and vent piping sizes as detailed in Table 3C below.

Table 3C Air Intake/Vent Piping Sizes

Model	Air Intake	Vent
81 - 211	3 inches	3 inches
286	4 inches	4 inches

NOTICE

Increasing or decreasing combustion air or vent piping is not authorized.

Minimum / Maximum allowable combustion air and vent piping lengths are as follows:

Combustion Air = 12 equivalent feet minimum / 100 equivalent feet maximum

Vent = 12 equivalent feet minimum / 100 equivalent feet maximum

When determining equivalent combustion air and vent length, add 5 feet for each 90° elbow and 3 feet for each 45° elbow.

EXAMPLE: 20 feet of PVC pipe + (4) 90° elbows + (2) 45° elbows + (1) concentric vent kit (CVK3003) = 49 equivalent feet of piping.

NOTICE

The appliance output rating will reduce by up to 1.5% for each 25 feet of vent length.

3 General venting

Table 3D Concentric Vent Kit Equivalent Vent Lengths

Model	Kit Number	Equivalent Vent Length
81 - 211	CVK3003	3 feet
286	CVK3007	3 feet

Removing from existing vent

Follow the instructions in Section 1, page 12 of this manual when removing a boiler from an existing vent system.

Vent and air piping

Vent and air system:

NOTICE

Installation must comply with local requirements and with the National Fuel Gas Code, ANSI Z223.1 for U.S. installations or CSA B149.1 for Canadian installations.

You must also install air piping from outside to the boiler air intake adapter. The resultant installation is direct vent (sealed combustion).

You may use any of the vent/air piping methods covered in this manual. Do not attempt to install the Knight boiler using any other means.

WARNING

DO NOT mix components from different systems. The vent system could fail, causing leakage of flue products into the living space. Use only approved stainless steel, PVC or CPVC pipe and fittings. For PVC/CPVC use with primer and cement specifically designed for the material used.

Vent, air piping and termination:

The Knight boiler vent and air piping can be installed through the roof or through a sidewall. Follow the procedures in this manual for the method chosen. Refer to the information in this manual to determine acceptable vent and air piping length.

Optional room air

NOTICE

Optional room air is intended for commercial applications. Combustion air piping to the outside is recommended for residential applications.

Commercial applications utilizing the Knight boiler may be installed with a single pipe carrying the flue products to the outside while using combustion air from the equipment room. In order to use the room air venting option the following conditions and considerations must be followed.

- The unit **MUST** be installed with the appropriate room air kit (Table 3E).
- The equipment room **MUST** be provided with properly sized openings to assure adequate combustion air. Please refer to instructions provided with the room air kit.

- There will be a noticeable increase in the noise level during normal operation from the inlet air opening.
- Using the room air kit makes the unit vulnerable to combustion air contamination from within the building. Please review Section 1, Prevent Combustion Air Contamination, to ensure proper installation.
- Vent system and terminations must comply with the standard venting instructions set forth in this manual.

WARNING

When utilizing the single pipe method, provisions for combustion and ventilation air must be in accordance with Air for Combustion and Ventilation, of the latest edition of the National Fuel Gas Code, ANSI Z223.1, in Canada, the latest edition of CGA Standard B149 Installation Code for Gas Burning Appliances and Equipment, or applicable provisions of the local building codes.

Table 3E Optional Room Air Kit

Model	Kit Number
81 - 211	KIT30052
286	KIT30053

Air contamination

Pool and laundry products and common household and hobby products often contain fluorine or chlorine compounds. When these chemicals pass through the boiler, they can form strong acids. The acid can eat through the boiler wall, causing serious damage and presenting a possible threat of flue gas spillage or boiler water leakage into the building.

Please read the information given in Table 1A, page 11, listing contaminants and areas likely to contain them. If contaminating chemicals will be present near the location of the boiler combustion air inlet, have your installer pipe the boiler combustion air and vent to another location, per this manual.

WARNING

If the boiler combustion air inlet is located in a laundry room or pool facility, for example, these areas will always contain hazardous contaminants.

WARNING

To prevent the potential of severe personal injury or death, check for areas and products listed in Table 1A, page 11 before installing the boiler or air inlet piping.

If contaminants are found, you **MUST**:

- Remove contaminants permanently.
- OR—
- Relocate air inlet and vent terminations to other areas.





