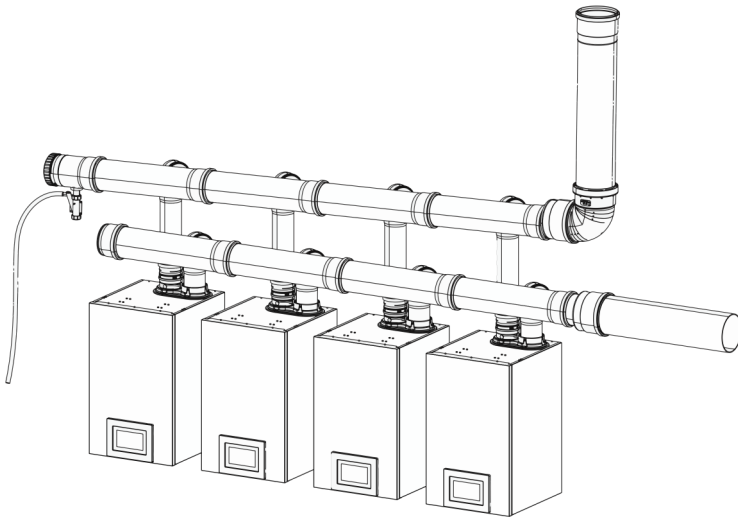


Rinnai Commercial Boiler

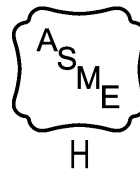
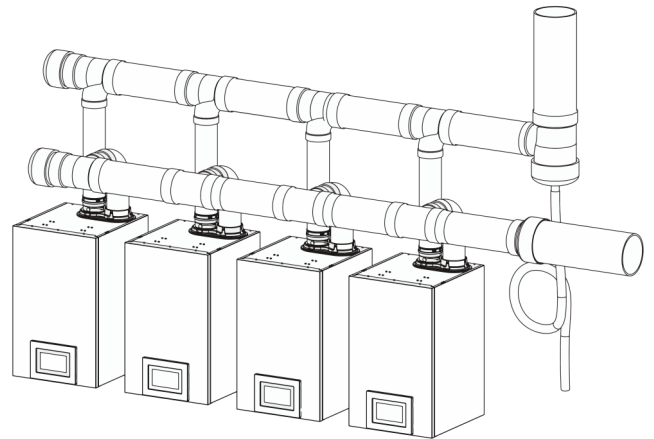
PP and PVC/CPVC COMMON VENTING INSTALLATION INSTRUCTIONS

Name	Polypropylene (PP) and PVC/CPVC Common Venting Installation Instructions for U.S. and Canadian Installations
Compatible Boiler Models	Rinnai Commercial Boiler Models: RCB301AN and RCB399AN

Polypropylene (PP)



PVC/CPVC



CERTIFIED TO ANSI Z21.13 - CSA 4.9

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Welcome

This document provides installation instructions for Rinnai Commercial Boiler Polypropylene (PP) and PVC/CPVC common venting and is a supplement to the Installation and Operations Manual supplied with the Rinnai Commercial Boiler. Common venting must satisfy all the requirements in the Installation and Operations Manual, as well as the requirements in this document. For detailed information and installation instructions on the Rinnai Commercial Boiler, refer to the “Rinnai Commercial Boiler Installation and Operation Manual” supplied with the boiler or view an online version at rinnai.us.

To The Installer

- This document is intended for the trained and qualified professional and is designed for licensed installers who should have skills such as:
 - Gas line sizing
 - Connecting gas lines, water lines, valves, and electricity
 - Knowledge of applicable national, state, and local codes
 - Installing venting through a wall or roof
 - Training on installation of Rinnai Commercial Boilers is accessible at rinnai.pro.myabsorb.com.
- The installation must conform to the Rinnai “Commercial Boiler Installation and Operation Manual” that is shipped with the unit, local codes, or in the absence of local codes, with the National Fuel Gas Code, ANSI Z223.1/NFPA 54, and/or Natural Gas and Propane Installation Code, CAN/CSA B149.1.
- Thermoplastic vent pipe must be certified to ULC S636 in Canada.
- Read all instructions contained in this document before installing the common venting system.
- Proper installation is the responsibility of the installer.
- A trained and qualified professional must test the common venting system for leaks before use.
- When installation is complete, give all manuals related to the common venting installation (including this document and the Rinnai Commercial Boiler Installation and Operation Manual) directly to the consumer or building manager. The documents should be stored in a readily accessible location for future reference.
- All images in this document are for illustration purposes only and are not necessarily to scale.

To The Consumer

- Keep this document for future reference. Be sure your common venting system is installed by a trained and qualified professional.

Safety

WARNING

- If the information in these instructions is not followed exactly, a fire or explosion may result causing property damage, personal injury, or death.
- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- **WHAT TO DO IF YOU SMELL GAS:**
 - Do not try to light any appliance.
 - Do not touch any electrical switch; do not use any phone in your building.
 - Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
 - If you cannot reach your gas supplier, call the fire department.
- Installation and service must be performed by a trained and qualified professional, service agency or the gas supplier.
- The warning signs in this document are here to prevent injury to you and others. Please follow them explicitly.
- Installations must comply with local requirements and with the National Fuel Gas Code, ANSI Z223.1/NFPA 54 for U.S. installations, and Natural Gas and Propane Installation Code, CAN/CSA B149.1 for Canadian installations.
- Use only the materials listed in this document for vent, air intake pipe, and fittings. Failure to comply with this warning could result in property damage.
- **DO NOT** slope the combustion air pipe toward the unit. Failure to comply with this warning could result in property damage, personal injury, or death.
- **DO NOT** apply PVC/CPVC glues, solvents, or cleaners to the condensing boiler's intake or exhaust gasket connections. Failure to correctly assemble the components according to these instructions and the "Rinnai Commercial Boiler Installation and Operation Manual" may result in property damage, personal injury, or death.

Venting Safety Setting

WARNING The instructions in this section explain how to adjust boiler settings to allow for higher exhaust temperatures. These instructions apply only for installations using CPVC or listed Polypropylene (PP). If these instructions are not followed exactly, a fire or carbon monoxide leak may result causing property damage, personal injury, or death. **DO NOT** adjust boiler settings to allow higher exhaust temperatures when venting with PVC.

This product is equipped with safety devices to control the exhaust temperature which allows for a variety of venting materials to be used in its final installation. The boiler is set up from the factory to be installed with a PVC venting system and a built-in control to limit the exhaust temperature to be below 149°F (65°C). In high temperature applications where the exhaust temperature can exceed 149°F (65°C), CPVC or listed Polypropylene (PP) venting must be used. The choice of venting materials may have an impact on overall performance. Also, If the vent material is other than PVC (CPVC or listed PP) follow the procedure below to adjust the internal settings.

High Temperature Vent Setting Instructions

1. Press “Setup” on the home screen (Fig 1).The control will prompt the user to choose the access level and enter password. The password for Installer is **9419**. The technician and Engineer user levels can **ONLY** be accessed by a Rinnai employee.

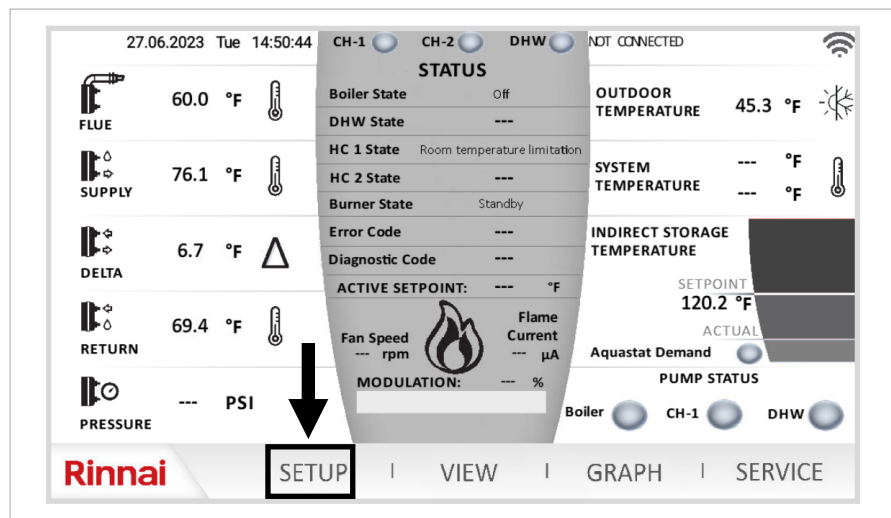


Fig 1

2. The first screen of the setup function appears. Press “Boiler Setup” menu to access the screen shown below.
3. Change the parameter “Vent Pipe Material” from “PVC” to “Other” to allow for higher vent temperature (Fig 2).

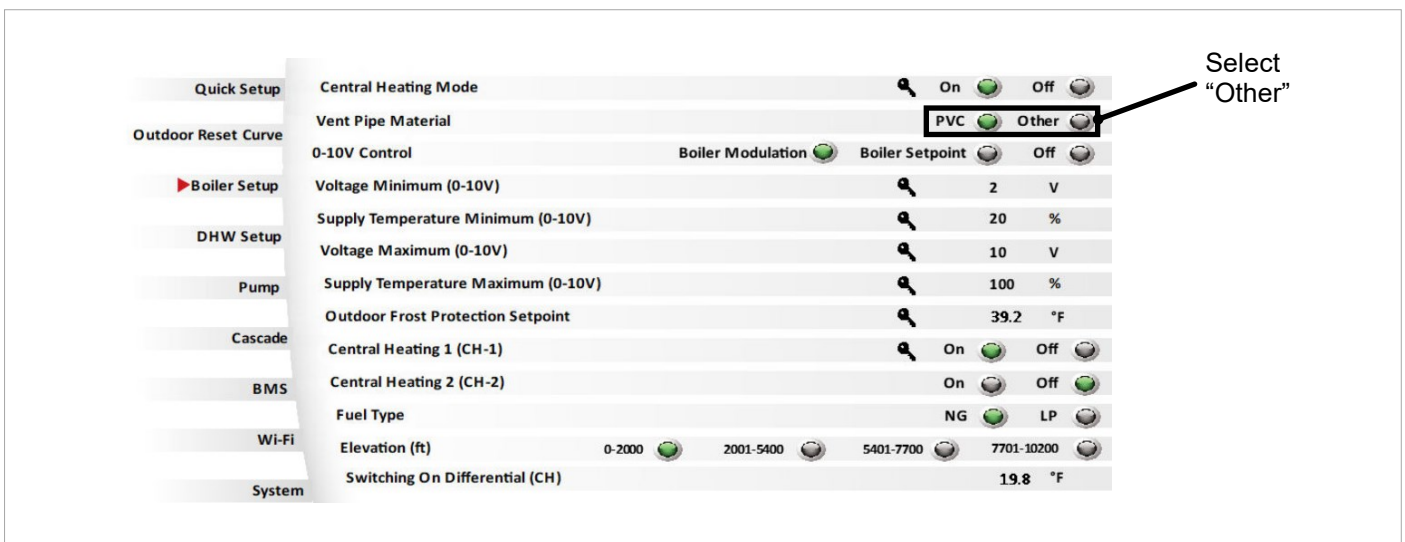


Fig 2

About the Common Venting System

Common venting allows multiple Rinnai Commercial Boilers to share the same vent system.

The Common Vent System provides longer vent lengths and fewer wall or roof penetrations than conventional single-unit venting.

Rinnai Commercial Boilers can only be common vented with Schedule 40 PVC/CPVC (Fig 3) or with a Rinnai certified Polypropylene (PP) common vent system.

1. PVC/CPVC Common Vent System

Features include:

- PVC common vent components are approved for use in the U.S. only.
- Canadian common vent installations must use CPVC common vent components.
- Certified to ANSI Z21.13 - CSA 4.9 for U.S. and Canadian installations.
- Venting material is comprised of PVC/CPVC. For the exhaust flue, U.S. installations utilize PVC, a CSA-certified and tested venting material. Canadian installations utilize PPS or CPVC, a ULC-S636-certified and tested venting material.
- 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).

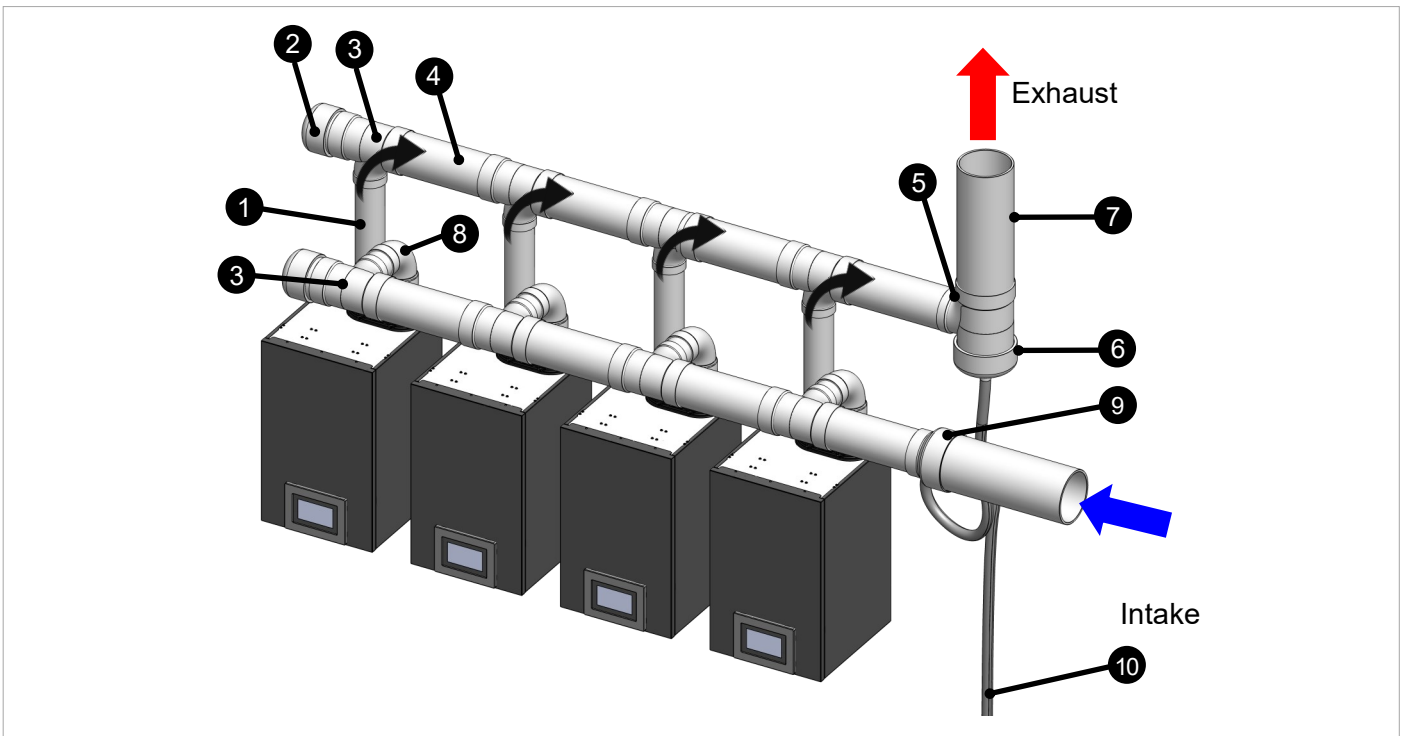


Fig 3. Schedule 40 PVC/CPVC Common Venting Example

Table 1

ITEM	DESCRIPTION	ITEM	DESCRIPTION
1	4 Inch PVC/CPVC pipe	6	6 Inch PVC/CPVC Cap 8 Inch PVC/CPVC Cap NOTE: Only used if increasing the vent size to 8 inch.
2	6 Inch PVC/CPVC Cap	7	6 Inch PVC/CPVC pipe 8 Inch PVC/CPVC pipe NOTE: Only used if increasing the vent size to 8 inch.
3	6 In x 6 In x 4 In PCV/CPVC Tee Wye	8	4 Inch PVC/CPVC Elbow
4	Rigid Vent Length Schedule 40 PVC/CPVC - 6 Inch	9	6 Inch x 8 In PVC/CPVC Increaser NOTE: Only used if increasing the vent size to 8 inch.
5	6 In x 6 In x 6 In PCV/CPVC Tee 8 In x 8 In x 6 In PCV/CPVC Tee NOTE: Only used if increasing the vent size to 8 inch.	10	Condensate Drain Line Hose

About the Common Venting System

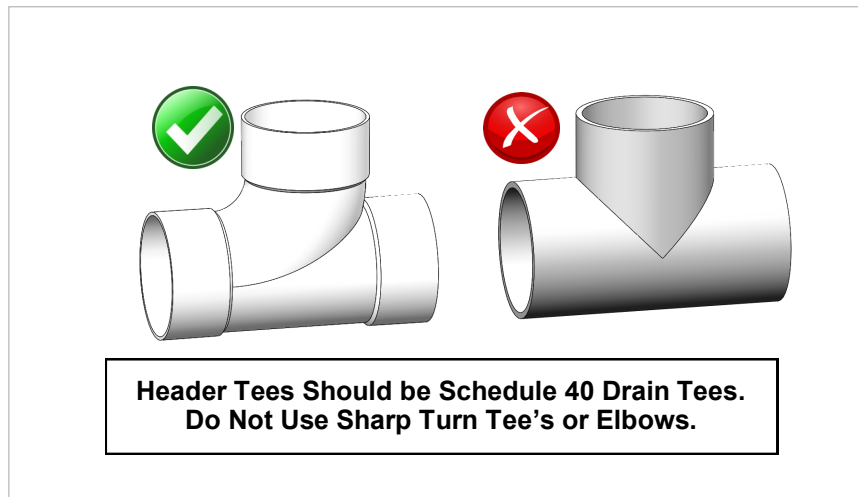


Fig 4

2. Polypropylene (PP) Common Vent System

Features include:

- 6 in. common vent PPTL common vent components are approved for use in the U.S. only and not available for installations in Canada.
- Canadian common vent installations must use 6 in. PPS (gray) common vent components.
- Certified to ANSI Z21.13 - CSA 4.9 for U.S. and Canadian installations.
- Venting material is comprised of Polypropylene (PP). For the exhaust flue, U.S. installations utilize PPTL, a CSA-certified and tested venting material. Canadian installations utilize PPS, a ULC-S636-certified and tested venting material from Ubbink.
- The various sections are self-locking and sealing and can be pushed together without use of cement or glue.

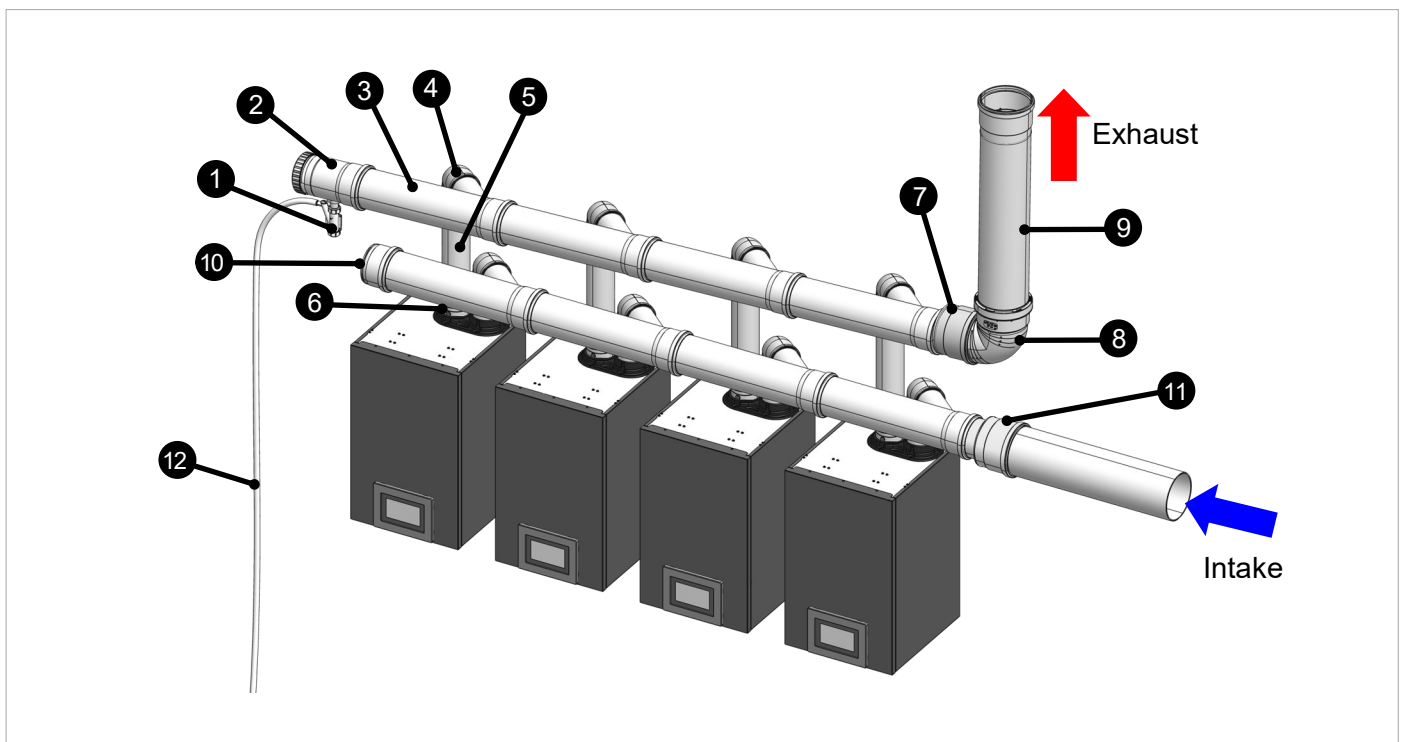

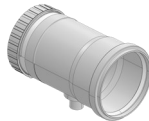
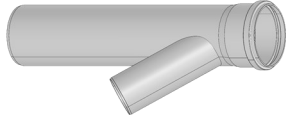






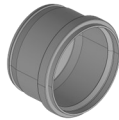



Fig 5. Polypropylene (PP) Common Venting Example

About the Common Venting System

Table 2

ITEM	DESCRIPTION	CENTROTHERM PART NUMBER	IMAGE
1	Condensate Trap (Siphon)	IASJBVS	
2	Horizontal Drain Fitting—ISHDF - 6 Inch	ISHDF06	
3	Branch Tee - ISBT - 6 Inch x 4 Inch	ISBT060436	
4	87° Elbow - ISEL87 - 4 Inch	ISELS0487	
5	Rigid Vent Length - 4 Inch - 12" Long Rigid Vent Length - 4 Inch - 24" Long	ISVL041 ISVL042	
6	Appliance Adapter (PVC to PP) - 4 Inch	ISAAL0404	
7	Eccentric Increaser - 6 inch to 8 Inch NOTE: Only used if increasing the vent size to 8 inch.	ISEI0608	
8	87° Elbow - 6 Inch 87° Elbow - 8 Inch (Note: Only used if increasing vent to 8 inch)	ISELS0687 ISELS0887	
9	Rigid Vent Length - 6 Inch - 12" Long Rigid Vent Length - 6 Inch - 24" Long Rigid Vent Length - 6 Inch - 36" Long Rigid Vent Length - 6 Inch - 72" Long Rigid Vent Length - 6 Inch - 120" Long	SVL061 SVL062 SVL063 SVL066 SVL0610	
	Rigid Vent Length - 8 Inch - 12" Long Rigid Vent Length - 8 Inch - 24" Long Rigid Vent Length - 8 Inch - 36" Long Rigid Vent Length - 8 Inch - 72" Long Rigid Vent Length - 8 Inch - 120" Long (Note: Only used if increasing vent to 8 inch)	SVL081 SVL082 SVL083 SVL086 SVL0810	
10	Tee Cap - 6 Inch	ISTC06	
11	Centric Increaser - 6 inch to 8 Inch NOTE: Only used if increasing the vent size to 8 inch.	ISIA0608	
12	Condensate Drain Line Hose	N/A	Customer supplied

Venting Guidelines

- Vent termination per ANSI Z223.1/NFPA 54, and/or Natural Gas and Propane Installation Code, CAN/CSA B149.1. For clearances not specified in ANSI Z223.1/NFPA 54, and/or Natural Gas and Propane Installation Code, CAN/CSA B149.1, clearances are in accordance with local installation codes and the requirements of the gas supplier.
- Use only the materials listed in this document for vent and fittings. Failure to comply with this warning could result in property damage, personal injury, or death.
- When cutting vent components, ensure that the cuts are straight.
- Chamfer and deburr all edges before installing the components.
- Vent joints must not leak. Confirm gas tight connections of every vent joint.
- Before operating the boiler(s), ensure the vent system is clean and free of debris.
- The vent system must be supported according to the PVC/CPVC manufacturer's installation instructions.
- Venting should be as direct as possible with a minimum number of fittings.
- The common vent system must only be installed by a trained and qualified professional.



WARNING

DO NOT slope the combustion air pipe toward unit. Failure to comply with this warning could result in property damage, personal injury, or death.

DO NOT apply PVC/CPVC glues, solvents, or cleaners to the boiler's intake or exhaust gasket connections. Failure to correctly assemble the components according to these instructions may result in property damage, personal injury, or death.

DO NOT:

- Do not exceed the maximum number of units indicated in this document.
- Do not use cellular core PVC (ASTM F891), cellular core CPVC, Radel® (polyphenolsulfone) ABS or galvanized material for the exhaust vent.
- Do not combine vent components from different manufacturers.
- Do not connect the venting system with an existing vent or chimney.
- Do not cover vent components with thermal insulation.
- Do not common vent with the vent pipe of any other type of boiler or appliance.
- Do not reduce vent diameter to less than 4 in.
- Do not install the boiler in an area of negative pressure.
- Do not install the boiler, venting, and vent termination(s) in any areas where the air may contain corrosive compounds.

MUST DO:

- You must use vent components that are certified and listed with the boiler model.
- The vent system must vent directly to the outside of the building and use outside air or room air for combustion.
- Avoid dips or sags in horizontal vent runs by installing supports per the vent manufacturer's instructions.
- Support horizontal vent runs a minimum of every four feet and all vertical vent runs a minimum of every six feet.
- Venting should be as direct as possible with a minimum number of pipe fittings.
- Vent components connected to the boiler exhaust must be secured with clamps to the boiler vent adapter. Intake pipes must be secured to the boiler adapter using provided self tapping screws. Do not use any glues or solvents to connect vent components to the boiler.
- Set the temperature setting on all boilers being common vented to the same temperature.
- A 4 in. straight pipe connected to the boiler must be switched to a proper header size within 2 ft (61 cm).

Schedule 40 PVC/CPVC Common Vent Guidelines

⚠ WARNING PVC solvents (primer and glue) can be extremely flammable. Vapors may cause a flash fire or explosion resulting in property damage, personal injury or death.

- Keep solvents away from heat, sparks, flames and all other sources of ignition.
- Do not solder, cut or weld until all vapors have dissipated.
- PVC solvents are heavier than air causing them to settle at low points of the system.
- Before using PVC solvent: Disconnect power to the boiler. Remove the front cover of the boiler. Ensure areas around the boiler and PVC venting are well ventilated. Allow all vapors to dissipate before applying power to the system or introducing any other source of ignition.

When installing PVC/CPVC common venting, follow these guidelines:

- Avoid sharp bends or tees in the vent system. These vent components create additional restrictions that could reduce performance of the boilers.
- PVC combustion air and exhaust should terminate with elbow pointing down or tee. This will stop unwanted moisture from entering the vent system.
- Fire rated penetrations shall be fire stopped. Contact your vent supplier or local firestop manufacturer for appropriate firestop methods.
- Examine all vent components for damage prior to installation.
- PVC/CPVC vent systems must be free to expand and contract. Refer to the vent manufacturer's installation instructions for appropriate support methods.
- PVC/CPVC venting must include unrestricted vent movement through walls, ceilings, and roof penetrations.
- Use only PVC/CPVC primer and cement approved for use by the vent manufacturer.
- Refer to vent manufacturer's installation instructions for proper joint assembly procedures and products.
- PVC/CPVC common venting should include a condensate drain and trap between the header and vent length. Condensate trap must include a loop that can hold 6 in. (15 cm) of water (Fig 6).

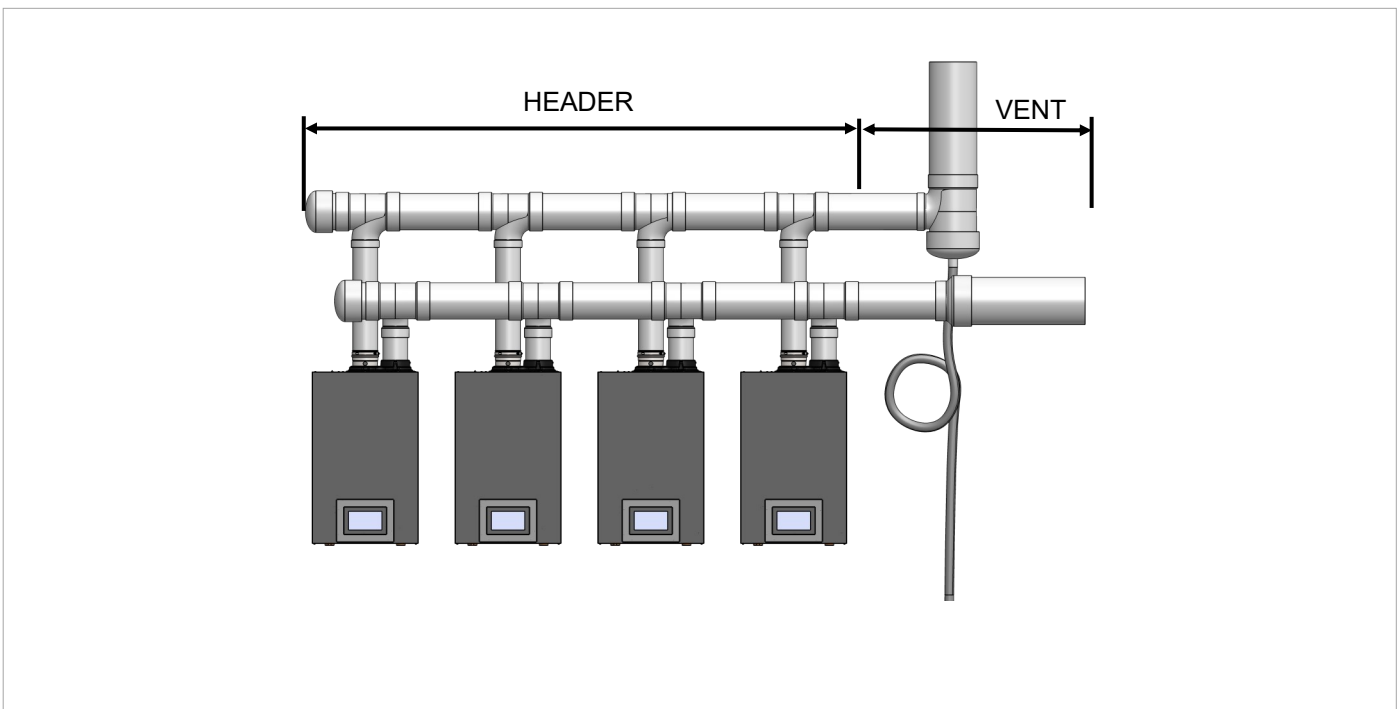





Fig 6. Header, Vent Length and Condensate Trap

DO NOT

- DO NOT mix vent pipe, fittings or joining methods from different vent manufacturers.
- DO NOT attempt to repair damaged vent. Damaged vent components must be replaced.
- DO NOT use short radius elbows in the common vent system.

Table 3. Acceptable and Not Acceptable Elbows

ACCEPTABLE	ACCEPTABLE	NOT ACCEPTABLE
90° Elbows, Long Sweep	90° Elbows, Short Sweep	90° Elbows, Close Turn
		

Common Vent Maximum Equivalent Vent Lengths

For the table below (for use with Commercial Boilers):

- Header is the main vent pipe into which several vents connect (Fig 7).
- Vent Length is the distance from the end of the header to the vent termination (Fig 7).
- Maximum vent length starts at the end of the header system.
- Use 9 ft (2.7 m) as equivalent vent length for 90° elbows.
- Use 6 ft (1.8 m) as equivalent vent length for every two 45° elbows.

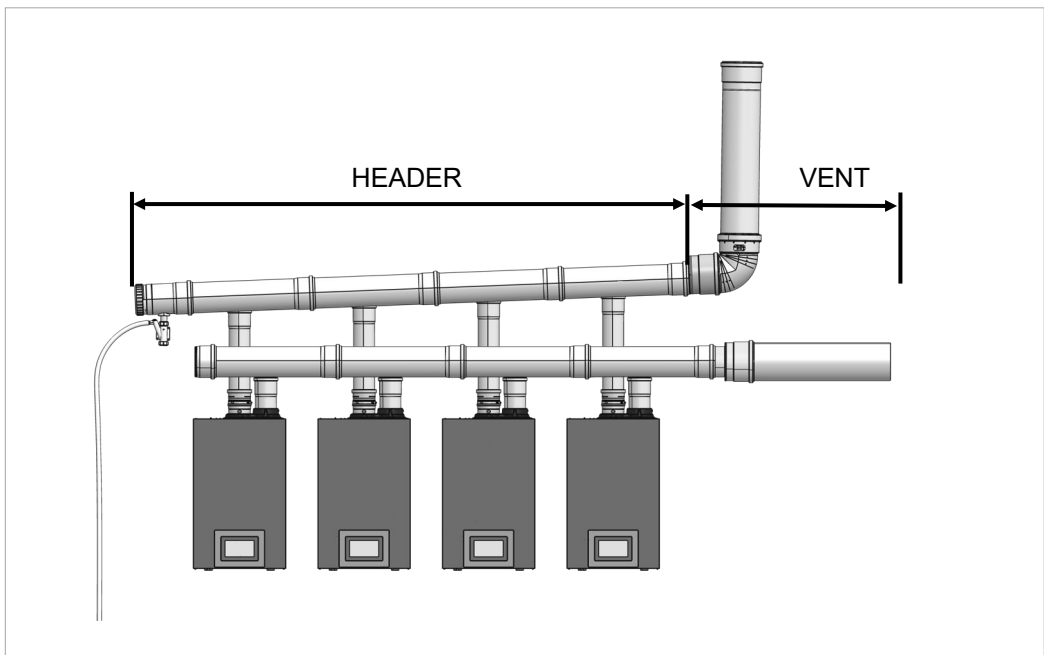


Fig 7. Header and Vent Length

Table 4. Common Vent Maximum Equivalent Vent Length

Boiler Model	# Boilers	Max System BTU/HR	Header Size (in.)	6 in. Vent Diameter		8 in. Vent Diameter	
				Room Air	Twin Pipe	Room Air	Twin Pipe
RCB301AN	2	602,000	6	150 ft	150 ft		
	3	903,000		150 ft	96 ft		150 ft
	4	1,204,000		36 ft	18 ft	150 ft	150 ft
RCB399AN	2	798,000	6	150 ft	150 ft		
	3	1,197,000		72 ft	27 ft	150 ft	150 ft
	4	1,596,000				150 ft	150 ft

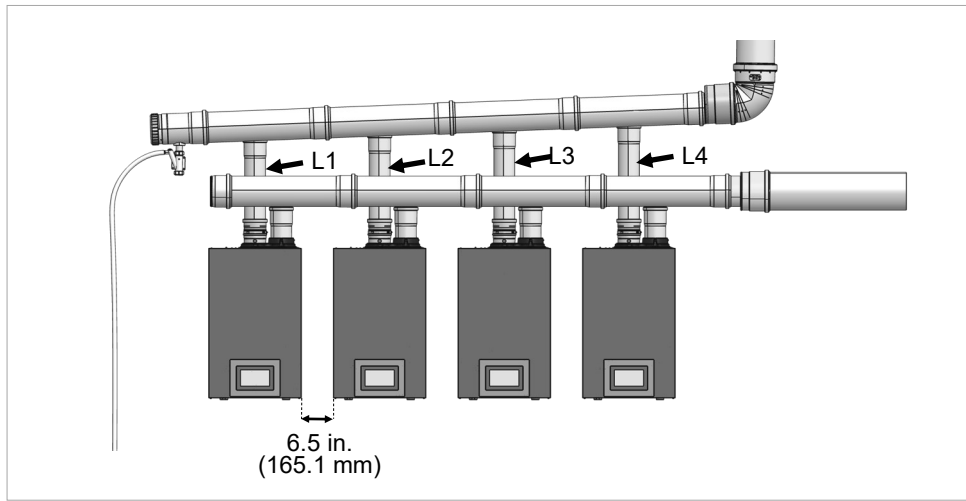


Fig 8 Typical distance between unit.

NOTE
 The distance shown is ONLY a reference in order to use Polypropylene branch tee without cutting.

Table 5. Cutting Line Table Applicable up to 4 Units.

Inline # of Units	L =
1	19.75 in. (502 mm)
2	20.75 in. (527 mm)
3	21.75 in. (552 mm)
4	22.75 in. (578 mm)

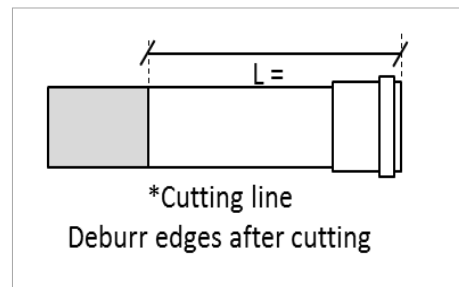


Fig 9. Cutting Line

High Altitude Installations

High altitude installations are certified up to 10,200 ft (3,109 m). Reference the “Commercial Boiler Installation and Operation Manual” to set the boilers up for the altitude at which they will be operating.

High Altitude Derate

Commercial Boilers using common venting at altitudes over 2,000 ft (610 m) will automatically derate according to the tables below. Use the tables below for calculating your total BTU for multiple Commercial Boilers. De-rate values are based on proper combustion settings as recommended in the “Commercial Boiler Installation and Operation Manual”.

Altitude Venting:

For all installations above 2000 ft (609 m), the venting is reduced from 140 feet to 90 feet.

Air Intake: 90 Feet

Exhaust: 90 Feet

Table 6

Model	0 - 2000 ft (0-609 m)		2001 - 5400 ft (610 -1645 m)		5401 - 7700 ft (1646 - 2346 m)		7701 - 10200 ft (2347 - 3109 m)	
	NG	LP	NG	LP	NG	LP	NG	LP
RCB301AN	0.0 %	0.0 %	0.0 %	0.0 %	5.0 %	13.0 %	15.0 %	24.0 %
RCB399AN	0.0 %	0.0 %	7.0 %	7.0%	16.0 %	20.0 %	23.0 %	27.0 %

NOTE: The values listed on the above table are the total percentage of boiler input de-rate for each elevation range.

2 Units Common Venting

Direct Vent

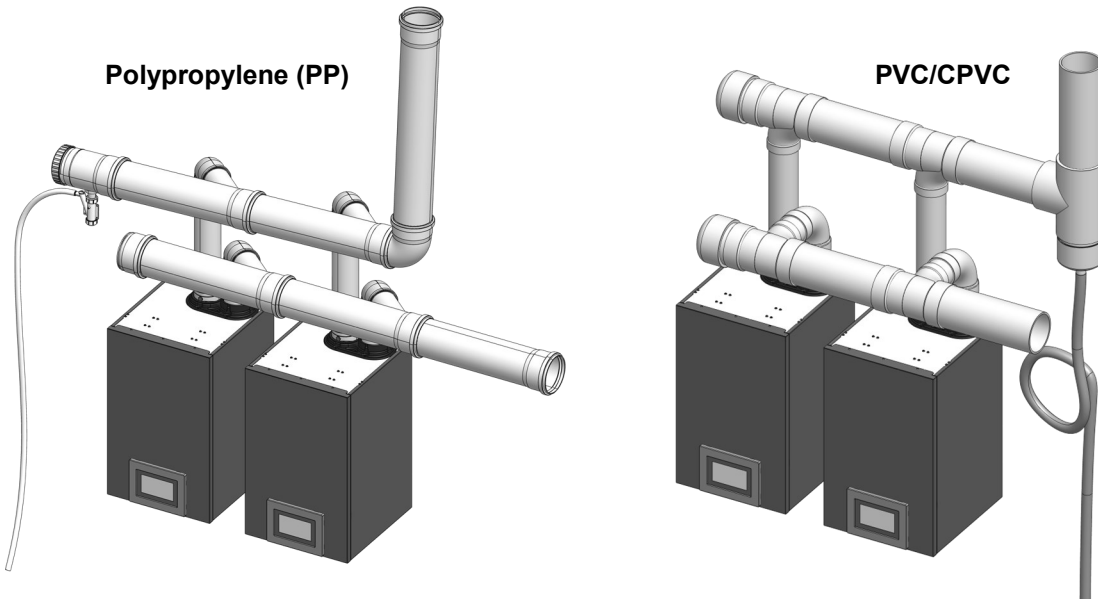


Fig 10. Direct Vent (2 units) Example

Room Air

- Refer to the "Combustion Air Requirements" section in this document for room air requirements.

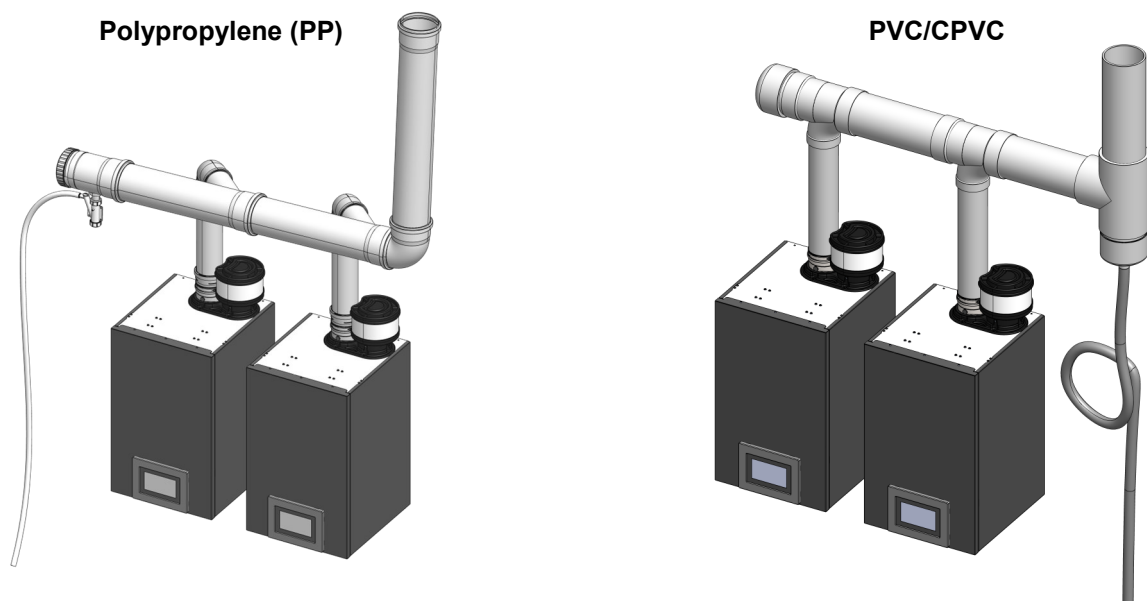
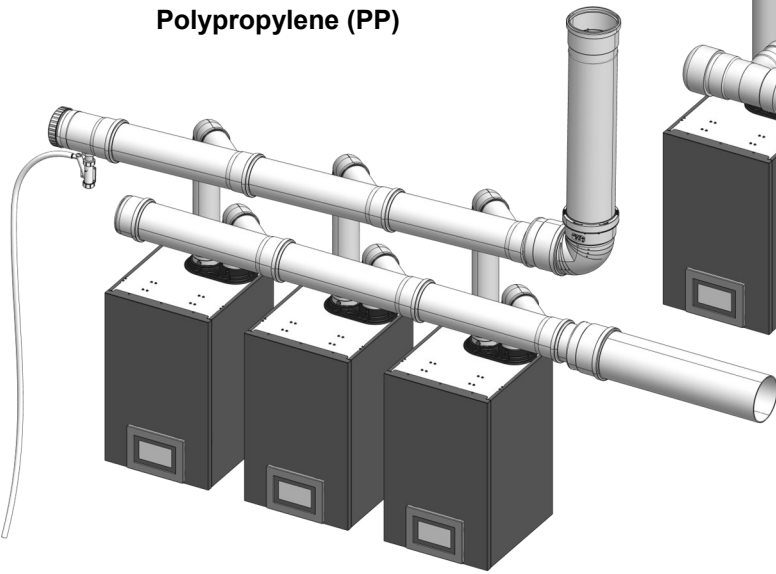


Fig 11. Room Air (2 units) Example

3 Units Common Venting

Direct Vent

Polypropylene (PP)



PVC/CPVC

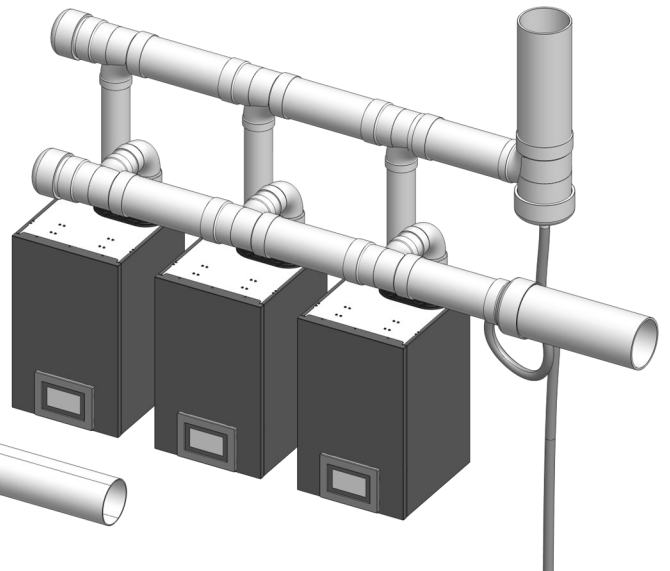
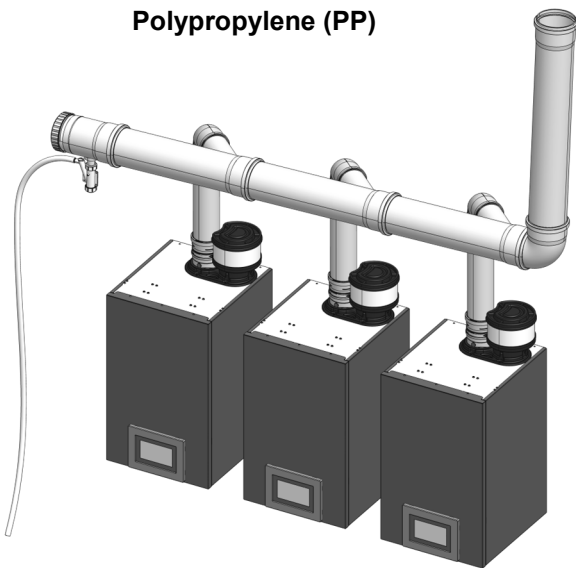


Fig 12. Direct Vent (3 units) Example

Room Air

- Refer to the “Combustion Air Requirements” section in this document for room air requirements.

Polypropylene (PP)



PVC/CPVC

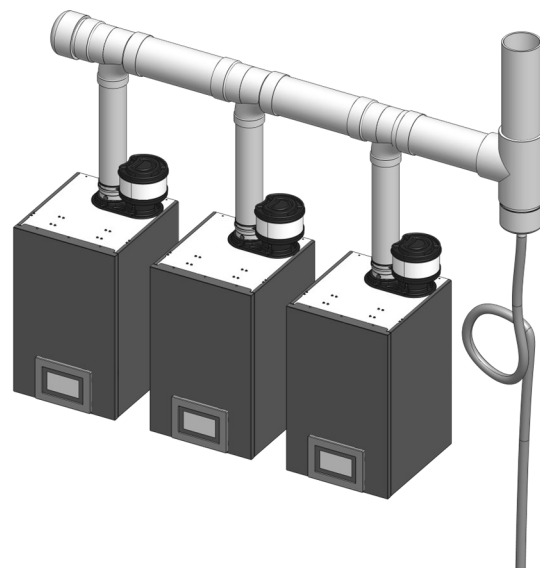


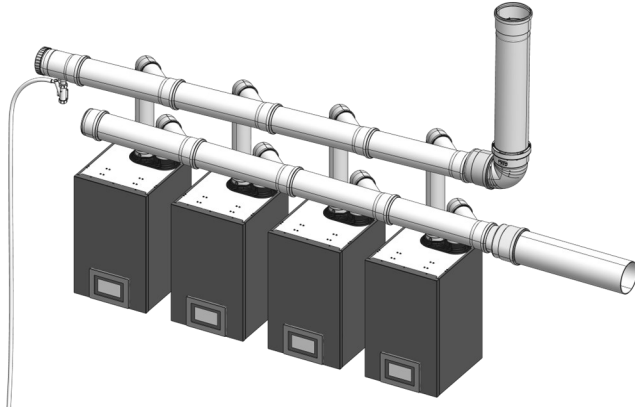
Fig 13. Room Air (3 units) Example

4 Units Common Venting

Direct Vent

- Maximum 4 Units

Polypropylene (PP)



PVC/CPVC

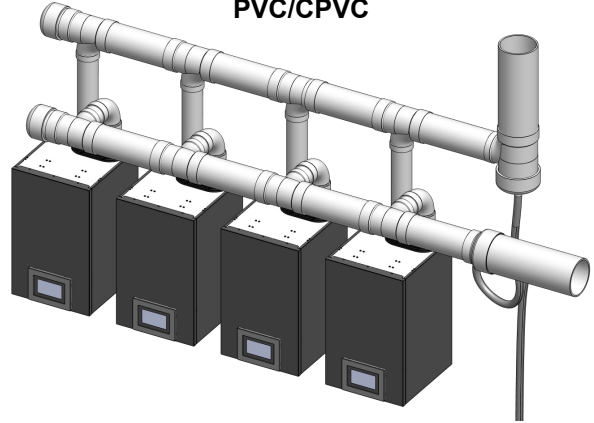
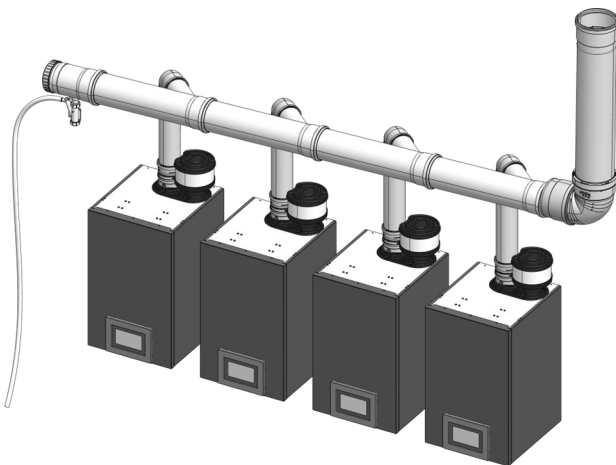


Fig 14. Direct Vent (4 units) Example

Room Air

- Refer to the “Combustion Air Requirements” section in this document for room air requirements.

Polypropylene (PP)



PVC/CPVC

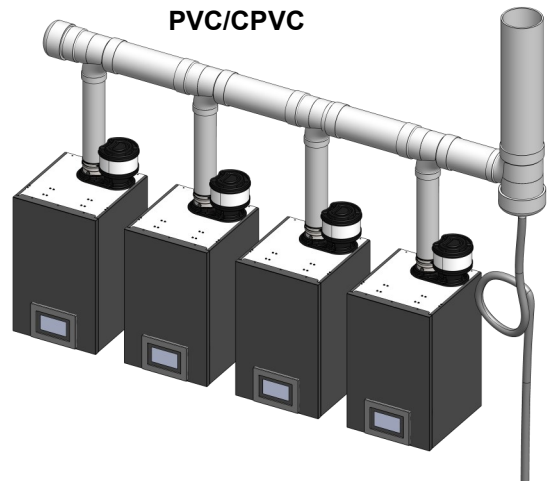


Fig 15. Room Air (4 units) Example

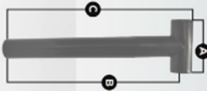





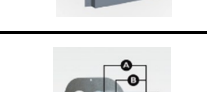


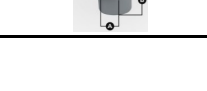


Common Vent Terminations

Following is a list of vent components and terminations. Install the correct venting for your model according to the venting manufacturer's instructions and the guidelines below. The information below is correct at time of publication and is subject to change without notice. Contact the vent manufacturer for questions related to the vent system, products, part numbers and instructions.

Table 7 : Approved Vent Manufacturers

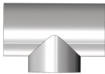

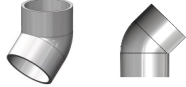
Manufacturer	Vent Material	Phone	Web Site
Centrotherm	Polypropylene	877-434-3432	www.centrotherm.us.com
IPEX	PVC/CPVC	U.S.: 800-463-9572 Canada: 866-473-9462	www.ipexamerica.com, www.ipexinc.com
Royal	PVC	800-232-5690	www.royalbuildingproducts.com
DiversiTech	PVC/CPVC	800-995-2222	www.diversitech.com

Table 8. Common Vent Terminations

Manufacturer	Manufacturer Part Number	Product Description	Diagram	Horizontal	Vertical
Centrotherm	ISTT0620	6 Inch Termination Tee		✓	✓
	ISTT0820	8 Inch Termination Tee		✓	✓
	ISEP06 / ISEP0639	6 Inch End Pipe (UV Black PP)		✓	✓
	ISEP086	8 Inch End Pipe (UV Black PP)		✓	✓
	ISCM06	6 Inch Chimney Cover w/ End Pipe (Gray)			✓
	ISCM08	8 Inch Chimney Cover w/ End Pipe (Gray)			✓
	IAFRF06	6 Inch Flat Roof Flashing			✓
	IAFRF08	8 Inch Flat Roof Flashing			✓
	IAPRF06	6 Inch Pitched Roof Flashing			✓
	IAPRF08	8 Inch Pitched Roof Flashing			✓
	ISLPT0606	6 Inch Low Profile Termination		✓	
	ISLTK06	6 Inch PPs to PVC Termination Kit		✓	
	ISEL0687UV	6 Inch 87° Elbow (UV rated)		✓	✓
	SEL0645UV	6 Inch 45° Elbow (UV rated)		✓	✓

Various 6 Inch and 8 Inch Schedule 40 PVC/CPVC Terminations:

Table 9. Schedule 40 PVC/CPVC Terminations

Product Description	Diagram	Horizontal	Vertical	Equivalent Length (ft)
Tee		✓	✓	10
90° Elbow		✓		10
45° Elbow		✓	✓	5

Horizontal Termination (Twin Pipe)

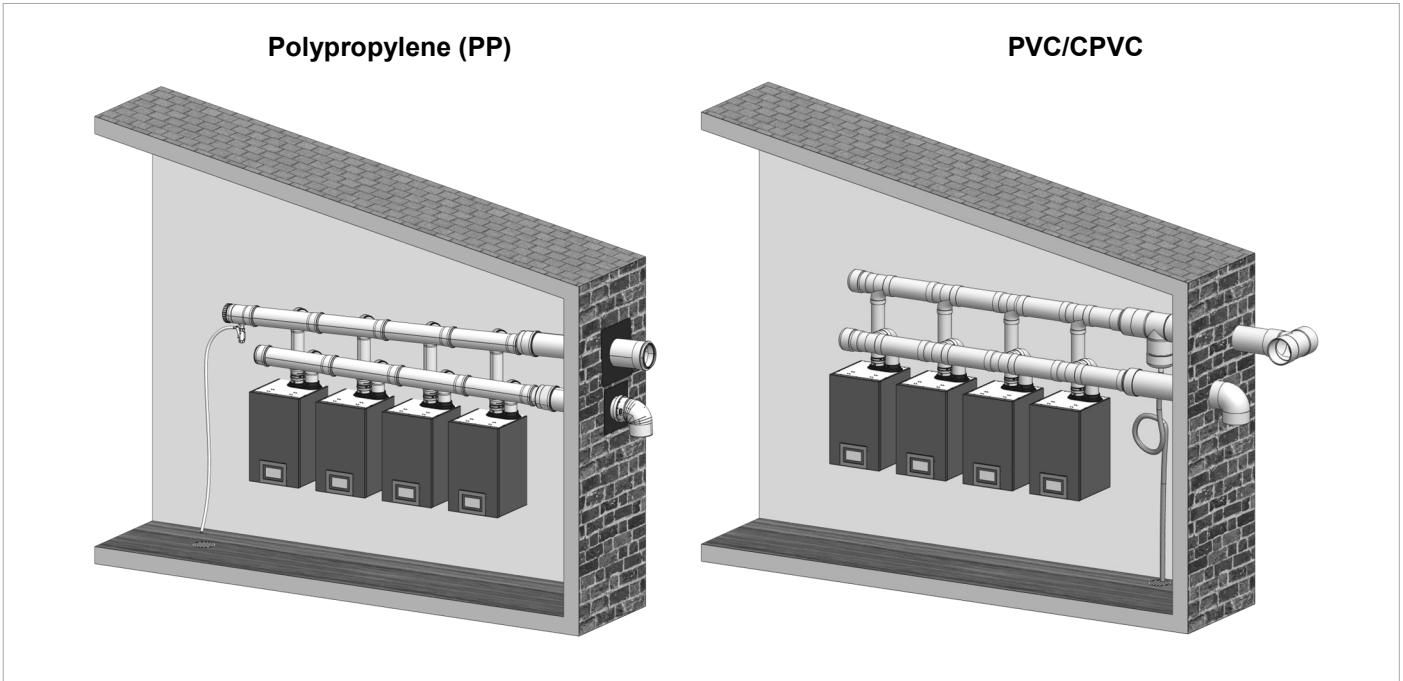


Fig 16. Sample Horizontal Termination Assembly (Twin Pipe)

Horizontal Termination (Room Air)

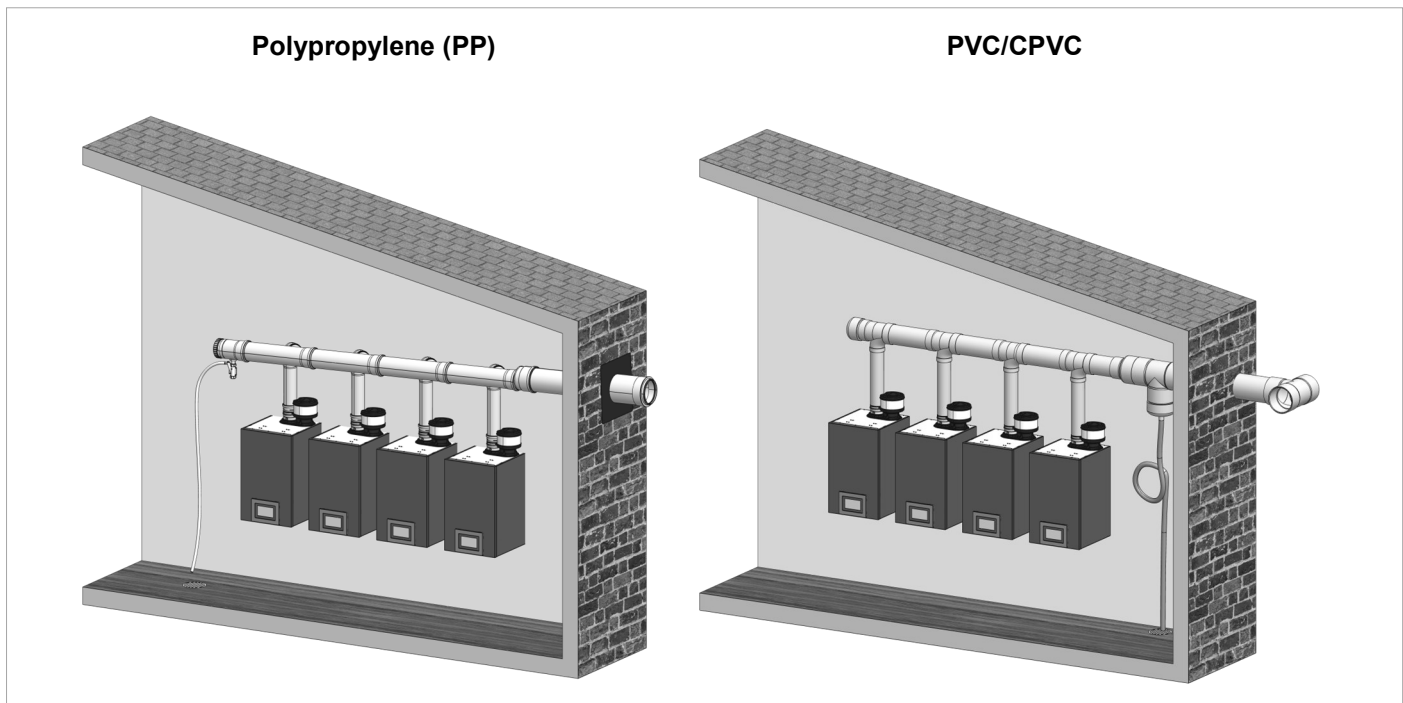


Fig 17. Sample Horizontal Termination Assembly (Room Air)

NOTE →

Vent termination per ANSI Z223.1/NFPA 54 and/or Natural Gas and Propane Installation Code, CAN/CSA B149.1. For clearances not specified in ANSI Z223.1/NFPA 54, and/or Natural Gas and Propane Installation Code, CAN/CSA B149.1, clearances are in accordance with local installation codes and the requirements of the gas supplier.

Horizontal Termination Clearance

The exhaust and combustion air terminations must follow these clearances:

- 12 in. (30 cm) minimum vertically from bottom of combustion air termination to ground or anticipated snow line (Fig 18 and 19).
 - 12 in. (30 cm) minimum from edge of exhaust termination to edge of combustion air termination (Fig 18 and 19).
- There should be a minimum of 36 in. (91 cm) horizontal distance between exhaust terminations in multiple common vent installations. Refer to the Rinnai “Commercial Boiler Installation and Operation Manual” for maximum vent lengths based on the vent diameter installed.

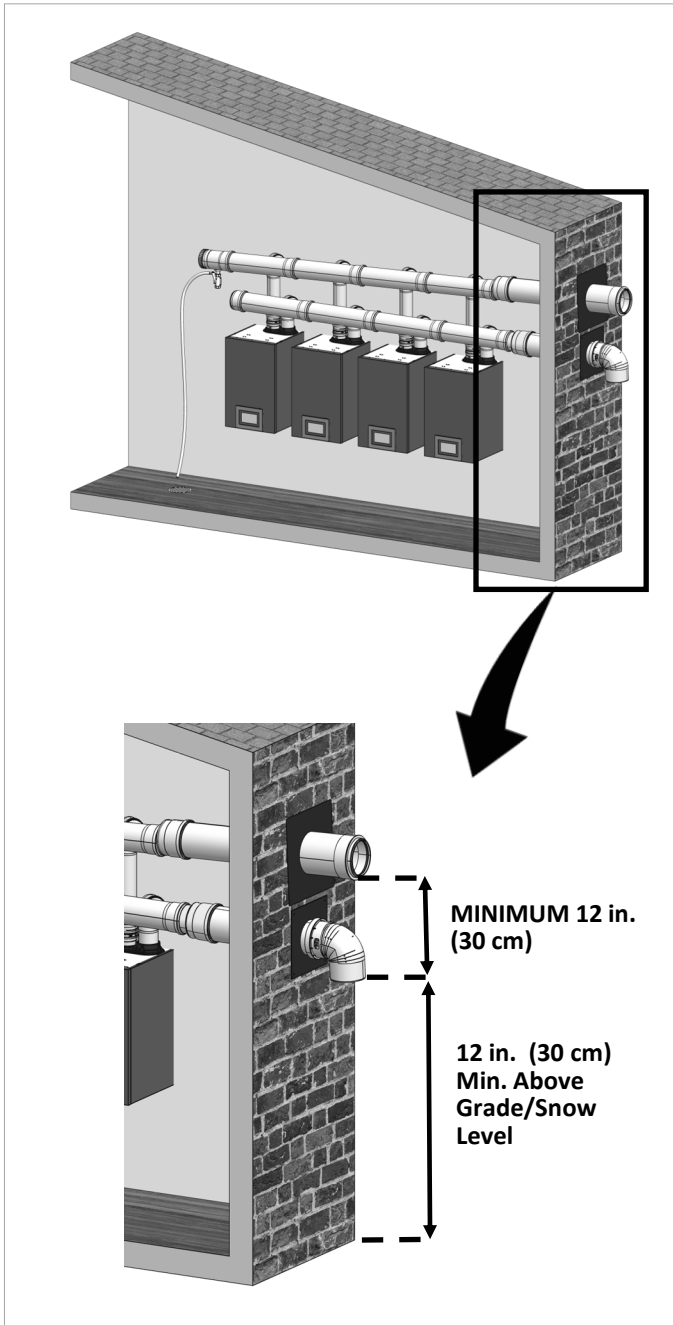


Fig 18. Exhaust and Combustion Air Termination Clearances

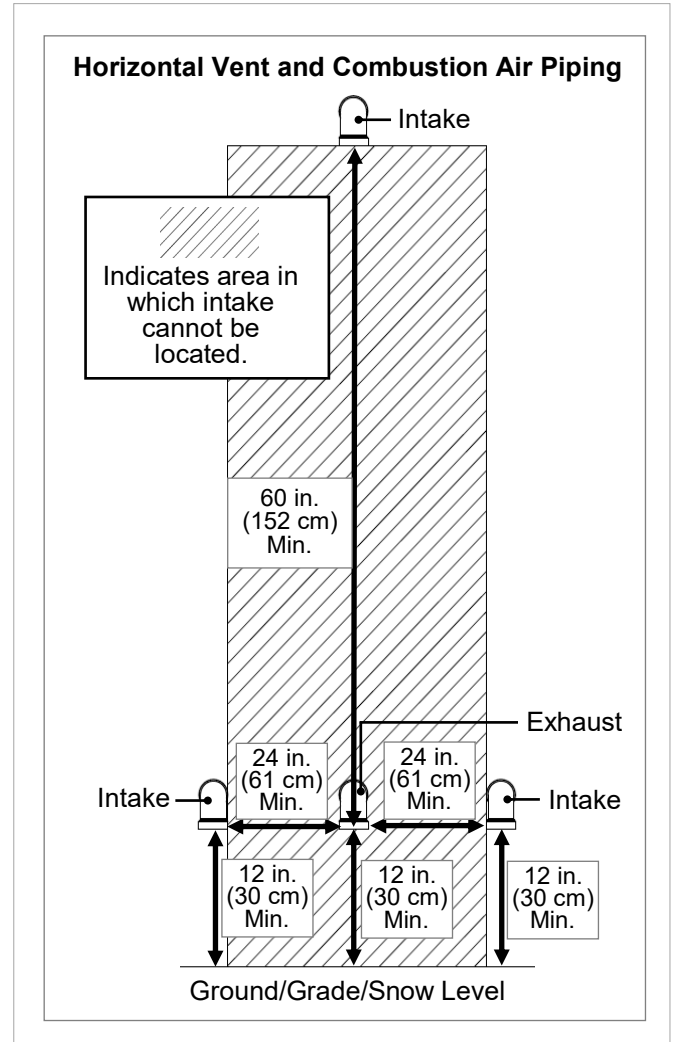


Fig 19. Horizontal Termination Clearances

NOTE

During colder weather when the exhaust temperature is much hotter than the outside air, the exhaust fumes will condense, producing water vapor. As a result, a plume of water vapor may be seen leaving the exhaust.

Vertical Termination - Twin Pipe

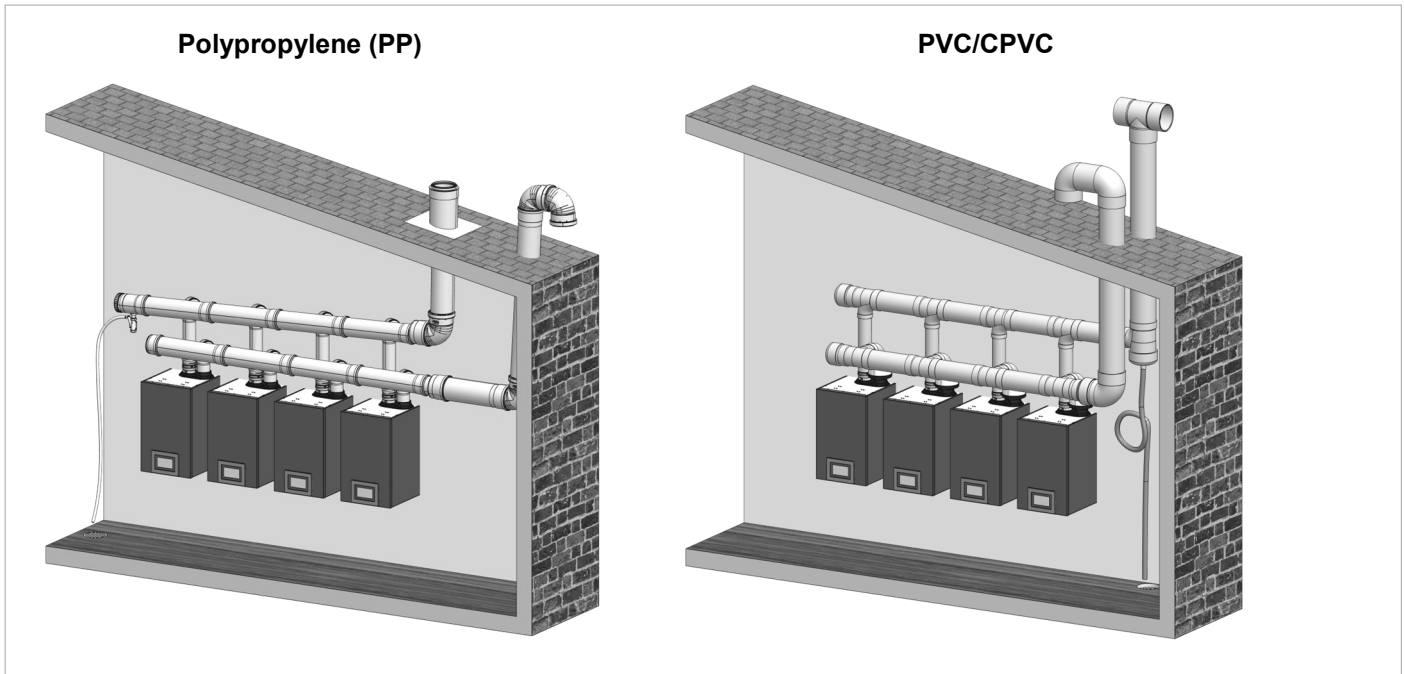


Fig 20

Vertical Termination - Room Air

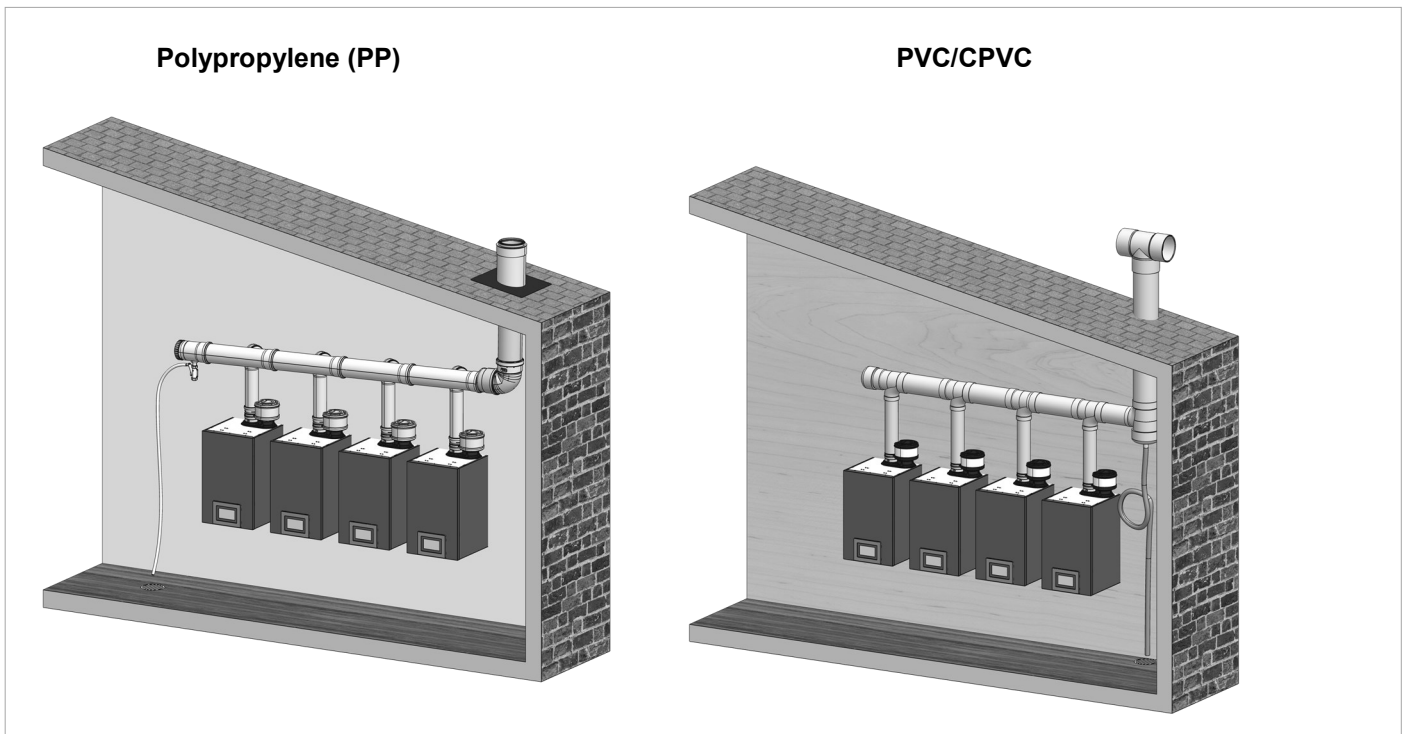


Fig 21. Sample Vertical Termination Assembly (Room Air)

NOTE →

Vent termination per ANSI Z223.1/NFPA 54 and/or Natural Gas and Propane Installation Code, CAN/CSA B149.1. For clearances not specified in ANSI Z223.1/NFPA 54, and/or Natural Gas and Propane Installation Code, CAN/CSA B149.1, clearances are in accordance with local installation codes and the requirements of the gas supplier.

Vertical Termination Clearance

Vertical Termination Clearances (All System Sizes)

There should be a minimum of 12 in. (305 mm) between exhaust and intake terminations.

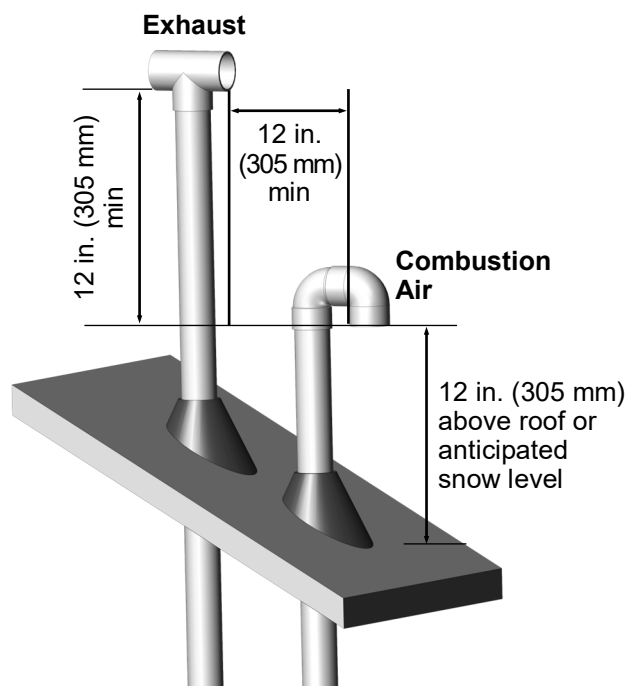
Clearances of Brackets:

All supports, such as wall brackets or spacer blocks, must be installed with a maximum distance of 78 in. (2 m) between each support. Additional supports can be installed before and after an elbow if needed.

Freestanding Components:

Components which are installed freestanding for vertical termination with a length of over 59 in. (1.5 m), must be additionally secured to the building with guy wires or braces.

Pitched Roof Termination Clearances:



NOTE →

Vent termination per ANSI Z223.1/NFPA 54 and/or Natural Gas and Propane Installation Code, CAN/CSA B149.1. For clearances not specified in ANSI Z223.1/NFPA 54, and/or Natural Gas and Propane Installation Code, CAN/CSA B149.1, clearances are in accordance with local installation codes and the requirements of the gas supplier.

Fig 22. Pitched Roof Termination Clearances

Unbalanced Venting

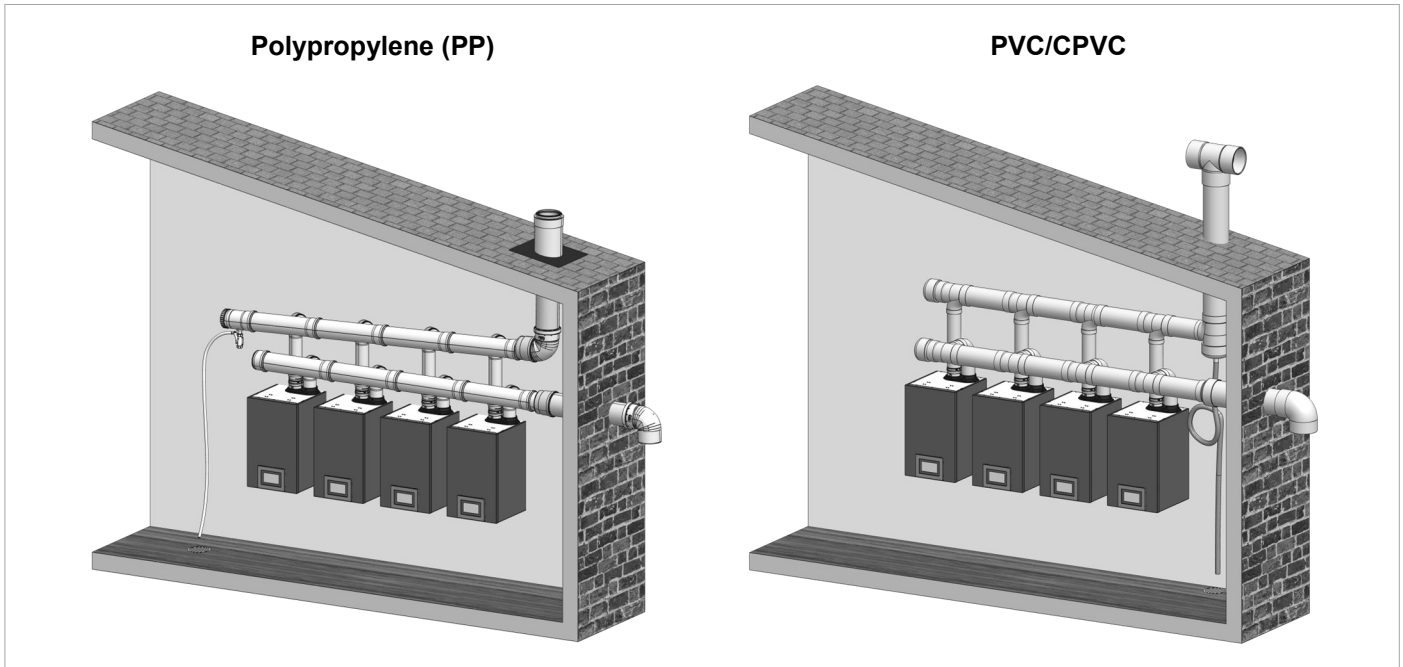


Fig 23. Sample unbalanced venting

NOTE

Vent termination per ANSI Z223.1/NFPA 54 and/or Natural Gas and Propane Installation Code, CAN/CSA B149.1. For clearances not specified in ANSI Z223.1/NFPA 54, and/or Natural Gas and Propane Installation Code, CAN/CSA B149.1, clearances are in accordance with local installation codes and the requirements of the gas supplier.

Maintenance Clearances

If the vent system is to be enclosed, it is suggested that the design of the enclosure shall permit inspection of the vent system. The design of such an enclosure shall be deemed acceptable by the installer or the local inspector.

Boiler Clearances

Refer to the "Commercial Boiler Installation and Operation Manual" for minimum clearance requirements around the boiler.

Combustion Air Requirements

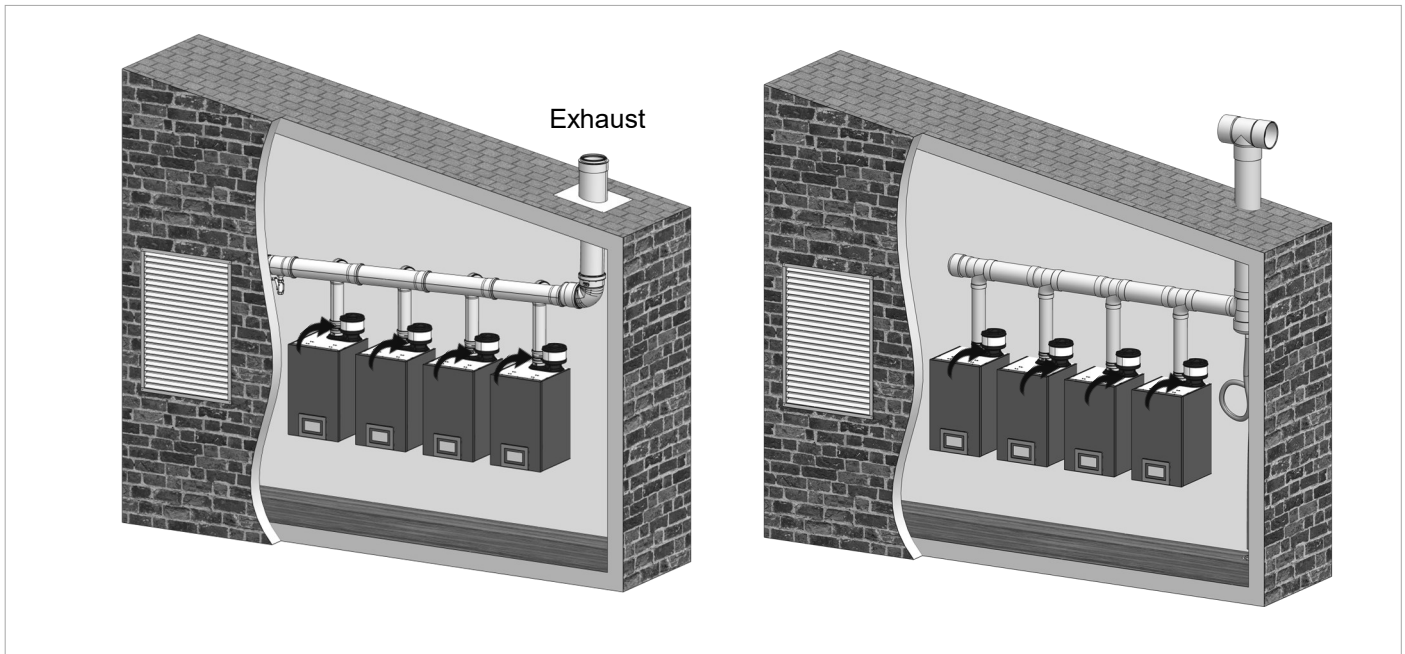


Fig 24. Exhaust Venting Example

This common vent system requires adequate combustion air for ventilation and dilution of flue gases. Failure to provide adequate combustion air can result in unit failure, fire, explosion, serious bodily injury or death. Use the following methods to ensure adequate combustion air is available for correct and safe operation of this rack system.

Important: Combustion air must be free of corrosive chemicals. Do not provide combustion air from corrosive environments. System failure due to corrosive air is not covered by warranty.

Combustion air must be free of acid forming chemicals such as sulfur, fluorine and chlorine. These chemicals have been found to cause rapid damage and decay and can become toxic when used as combustion air in gas appliances. Such chemicals can be found in, but not limited to bleach, ammonia, cat litter, aerosol sprays, cleaning solvents, varnish, paint, and air fresheners. Do not store these products or similar products in the vicinity of the boiler system.

Unconfined Space:

An unconfined space is defined in *National Fuel Gas Code, ANSI Z223.1/NFPA 54* as "a space whose volume is not less than 50 cubic feet per 1,000 Btu/hr (4.8 m³ per kW per hour) of the aggregate input rating of all appliances installed in that space. Rooms communicating directly with the space in which the appliances are installed, through openings not furnished with doors, are considered a part of the unconfined space." If the "unconfined space" containing the system is in a building with tight construction, additional outside air may be required for proper operation. Outside air openings should be sized the same as for a confined space.

Confined Space:

(Small Room, Closet, Alcove, Utility Room, Etc.)

A confined space is defined in the *National Fuel Gas Code, ANSI Z223.1/NFPA 54* as "a space whose volume is less than 50 cubic feet per 1,000 Btu/hr (4.8 m³ per kW per hour) of the aggregate input rating of the combined appliances installed in that space." A confined space must have two combustion air openings. Size the combustion air openings based on the BTU input for all gas utilization equipment in the space and the method by which combustion air is supplied.

Louvers and Grills

When sizing the permanent opening, consideration must be taken for the design of the louver or grills to maintain the free area required for all gas utilizing equipment in the space. If the free area of the louver or grill design is not available, assume wood louvers will have 25% free area and metal louvers or grills will have 75% free area. Under no circumstance should the louver, grill or screen have openings smaller than 1/4 in.

Example:

Wood: 10 in x 12 in x 0.25 = 30 in²

Metal: 10 in x 12 in x 0.75 = 90 in²

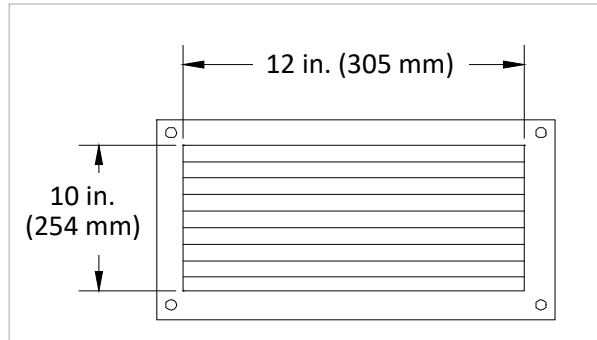


Fig 25. Louvers and Grills Spacing

Location

To maintain proper circulation of combustion air, two permanent openings (one upper, one lower) must be positioned in confined spaces. The upper shall be within 12 in. (305 mm) of the top of the confined space and the lower opening shall be within 12 in. (305 mm) of the bottom of the confined space. Openings must be positioned as to never be obstructed.

Using Outdoor Air For Combustion

Outdoor air can be provided to a confined space through two permanent openings, one commencing within 12 in. (305 mm) of the top and one commencing within 12 in. (305 mm) of the bottom of the confined space. The openings shall communicate to the outside by one of two ways.

(Be sure to maintain 12 in. (305 mm) above grade or anticipated snow level).

Vent termination per ANSI Z223.1/NFPA 54 and/or Natural Gas and Propane Installation Code, CAN/CSA B149.1. For clearances not specified in ANSI Z223.1/NFPA 54, and/or Natural Gas and Propane Installation Code, CAN/CSA B149.1, clearances are in accordance with local installation codes and the requirements of the gas supplier.

Vent termination per ANSI Z223.1/NFPA 54. For clearances not specified in ANSI Z223.1/NFPA 54, clearances are in accordance with local installation codes and the requirements of the gas supplier.

(Be sure to maintain 12 in. (305 mm) above grade or anticipated snow level)

NOTE

Combustion air provided to the system should not be taken from any area of the structure that may produce a negative pressure (such as exhaust fans or powered ventilation fans).

Using Indoor Air For Combustion

When using air from other room(s) in the building, the total volume of the room(s) must be of adequate volume (greater than 50 cubic feet per 1,000 Btu/hr). Each combustion air opening must have at least one square inch of free area for each 1,000 Btu/hr, but not less than 100 square inches each.

When communicating directly with the outdoors through horizontal ducts, each opening shall have a minimum free area of $1 \text{ in}^2/2,000 \text{ Btu/hr}$ ($1,100 \text{ mm}^2/\text{kW}$) of total input rating of all appliances in the confined space. Note: If ducts are used, the cross sectional area of the duct must be greater than or equal to the required free area of the openings to which they are connected.

When communicating indirectly with the outdoors through vertical ducts, each opening shall have a minimum free area of $1 \text{ in}^2/4,000 \text{ Btu/hr}$ ($550 \text{ mm}^2/\text{kW}$) of total input rating of all appliances in the confined space. Combustion air to the appliance can be provided from a well ventilated attic or crawl space.



WARNING

TO PREVENT POSSIBLE PERSONAL INJURY OR DEATH DUE TO ASPHYXIATION, COMMON VENTING WITH OTHER MANUFACTURER'S INDUCED DRAFT APPLIANCES IS NOT ALLOWED.

Checklist for Combustion Air and Venting Requirements

- Verify proper clearances around the vents.
- Ensure that the "Combustion Air Requirements" are followed that will provide sufficient combustion air for the appliance.
- Ensure approved venting components have been used.
- All horizontal exhaust vent runs must be sloped upwards not less than 1/4 in/ft (21 mm/m) from the boiler to the vent terminal.
- Verify that there is adequate combustion air.
- Installation complies with *National Fuel Gas Code, ANSI Z223.1/NFPA 54*, and/or Natural Gas and Propane Installation Code, CAN/CSA B149.1 as well as local and state regulations therein.

Exhaust Vent Termination Clearances

Direct Vent for indoor models, you must install terminations to bring in combustion air and expel exhaust.

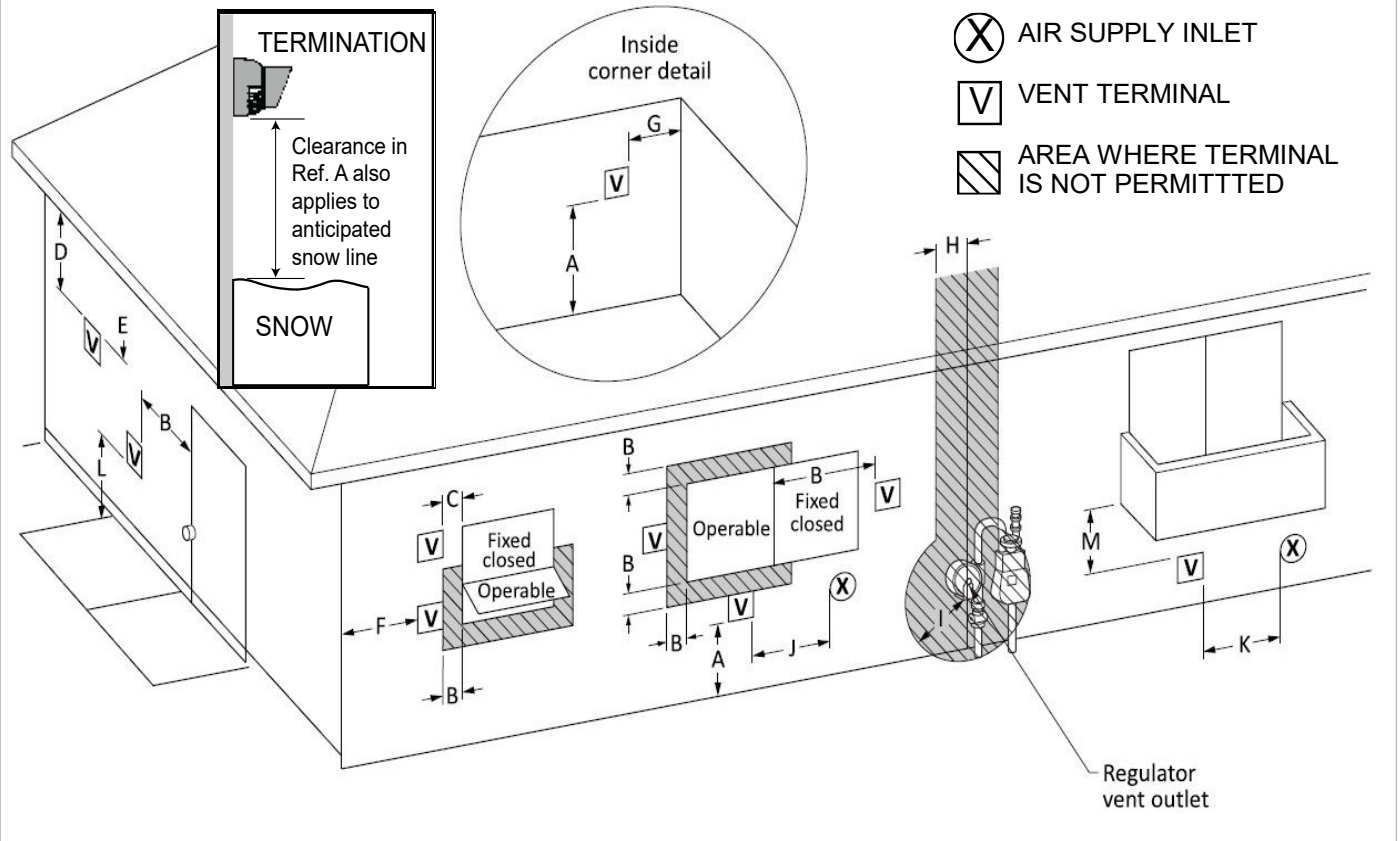


Fig 26

Table 10. Direct Vent Clearances

Ref	Description	Canadian Installations (CSA B149.1)	U.S. Installations (ANSI Z223.1 /NFPA 54)
		Direct Vent (Indoor Unit)	Direct Vent (Indoor Unit)
A	Clearance above grade, veranda, porch, deck, or balcony	12 in. (30 cm)	12 in. (30 cm)
B	Clearance to window or door that may be opened	36 in. (91 cm)	12 in. (30 cm)
C	Clearance to permanently closed window	*	*
D	Vertical clearance to ventilated soffit, located above the terminal within a horizontal distance of 2 ft (61 cm) from the center line of the terminal	*	*
E	Clearance to unventilated soffit	*	*
F	Clearance to outside corner	*	*
G	Clearance to inside corner	*	*
H	Clearance to each side of center line extended above meter/regulator assembly	*	*
I	Clearance to service regulator vent outlet	Above a regulator within 3 ft (91 cm) horizontally of the vertical center line of the regulator vent outlet to a maximum vertical distance of 15 ft (4 m)	*
J	Clearance to non-mechanical air supply inlet to building or the combustion air inlet to any other appliance	36 in. (91 cm)	12 in. (30 cm)
K	Clearance to a mechanical air supply inlet	6 ft (1.83 m)	3 ft (91 cm) above if within 10 ft (3 m) horizontally
L	Clearance above paved sidewalk or paved driveway located on public property	7 ft (2.13 m) [1]	*
M	Clearance under veranda, porch, deck, or balcony	12 in. (30 cm) [2]	*

Table 11

Clearance to opposite wall is 24 in. (61 cm).	
[1] A vent shall not terminate directly above a sidewalk or paved driveway that is located between two single family dwellings and serves both dwellings. [2] Permitted only if veranda, porch, deck, or balcony is fully open on a minimum of two sides beneath the floor.	* Clearances are in accordance with local installation codes and the requirements of the gas supplier.

Other than direct vent, when using room air for combustion, you must install terminations to expel exhaust.

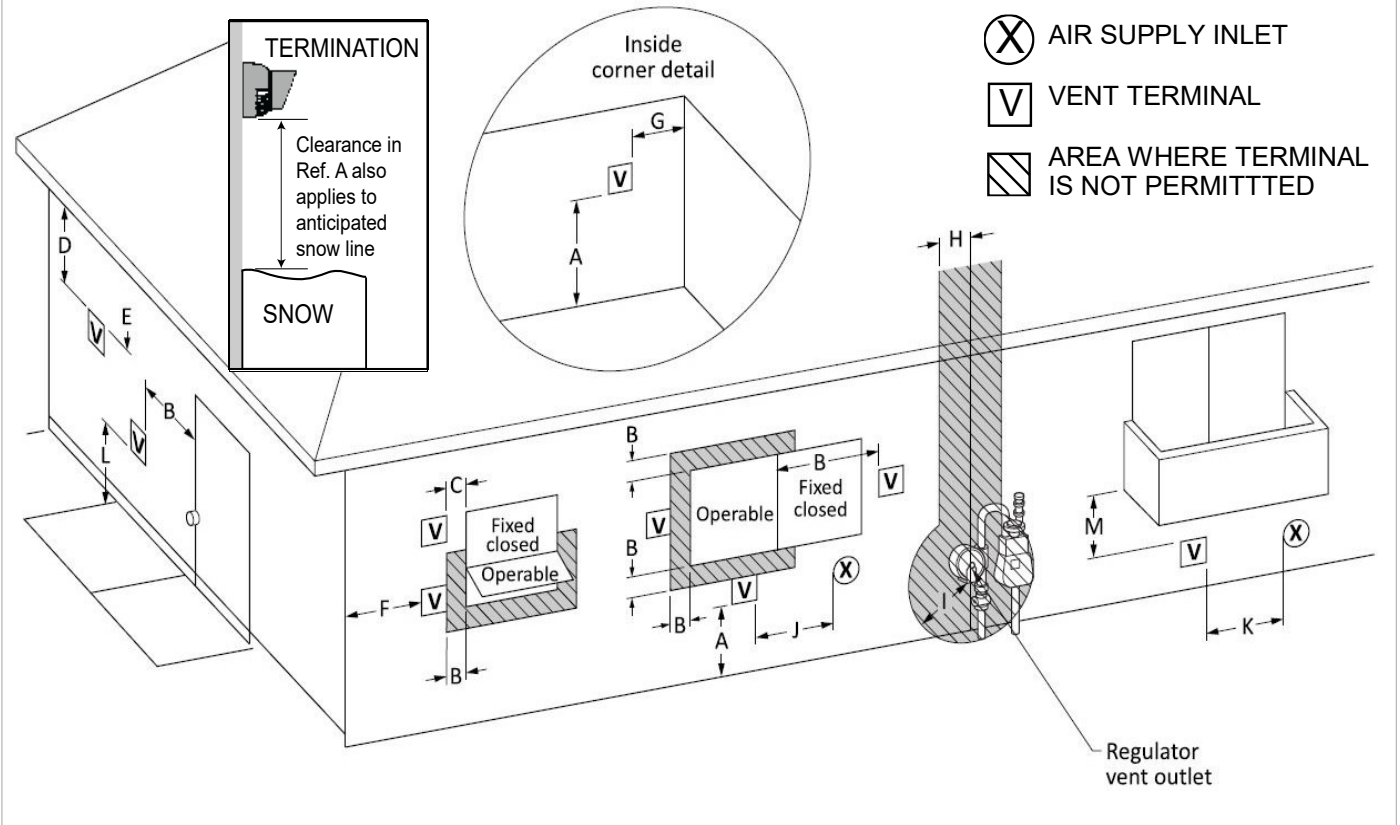


Fig 27

Table 12. Other Than Direct Vent Clearances

Ref	Description	Canadian Installations (CSA B149.1)	U.S. Installations (ANSI Z223.1/NFPA 54)
		Other than direct vent (Outdoor unit and/or Room Air)	Other than direct vent (Outdoor unit and/or Room Air)
A	Clearance above grade, veranda, porch, deck, or balcony	12 in. (30 cm)	12 in. (30 cm)
B	Clearance to window or door that may be opened	36 in. (91 cm)	4 ft (1.2 m) below or to side of opening; 1 ft (30 cm) above opening
C	Clearance to permanently closed window	*	*
D	Vertical clearance to ventilated soffit, located above the terminal within a horizontal distance of 2 ft (61 cm) from the center line of the terminal	*	*
E	Clearance to unventilated soffit	*	*
F	Clearance to outside corner	*	*
G	Clearance to inside corner	*	*
H	Clearance to each side of center line extended above meter/regulator assembly	*	*
I	Clearance to service regulator vent outlet	Above a regulator within 3 ft (91 cm) horizontally of the vertical center line of the regulator vent outlet to a maximum vertical distance of 15 ft (4 m)	*
J	Clearance to non-mechanical air supply inlet to building or the combustion air inlet to any other appliance	36 in. (91 cm)	4 ft (1.2 m) below or to side of opening; 1 ft (30 cm) above opening
K	Clearance to a mechanical air supply inlet	6 ft (1.83 m)	3 ft (91 cm) above if within 10 ft (3 m) horizontally
L	Clearance above paved sidewalk or paved driveway located on public property	7 ft (2.13 m) [1]	*
M	Clearance under veranda, porch, deck, or balcony	12 in. (30 cm) [2]	*

Table 13

Clearance to opposite wall is 24 in. (61 cm).	
[1] A vent shall not terminate directly above a sidewalk or paved driveway that is located between two single family dwellings and serves both dwellings. [2] Permitted only if veranda, porch, deck, or balcony is fully open on a minimum of two sides beneath the floor.	* Clearances are in accordance with local installation codes and the requirements of the gas supplier.

Additional Clearances

Check whether local codes supersede the clearances below.

- Avoid termination locations near a dryer vent.
- Avoid termination locations near commercial cooking exhaust.
- You must install a vent termination at least 12 in. (305 mm) above grade or snow line.

The vent for this appliance shall not terminate

- Over public walkways.
- Near soffit vents or crawl space vents or other areas where condensate or vapor could create a nuisance or hazard or cause property damage.
- Where condensate or vapor could cause damage or could be detrimental to the operation of regulators, relief valves, or other equipment.

Important considerations for locating vent termination under a soffit (ventilated or unventilated or eave vent; or to a deck or porch)

- Do not install vent termination under a soffit vent where exhaust can enter the soffit vent.
- Install vent termination so that exhaust and rising moisture will not collect under eaves. Discoloration to the exterior of the building could occur if installed too close.
- Do not install the vent termination too close under the soffit where it could present recirculation of exhaust gases back into the combustion air intake part of the termination.

(V) Represents the exhaust vent of the common venting.

(X) Represents the combustion air vent of the common venting.

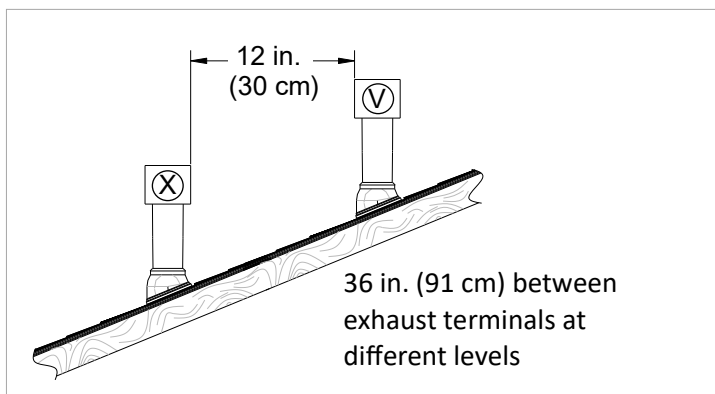


Fig 28. Exhaust and Combustion Air Vents

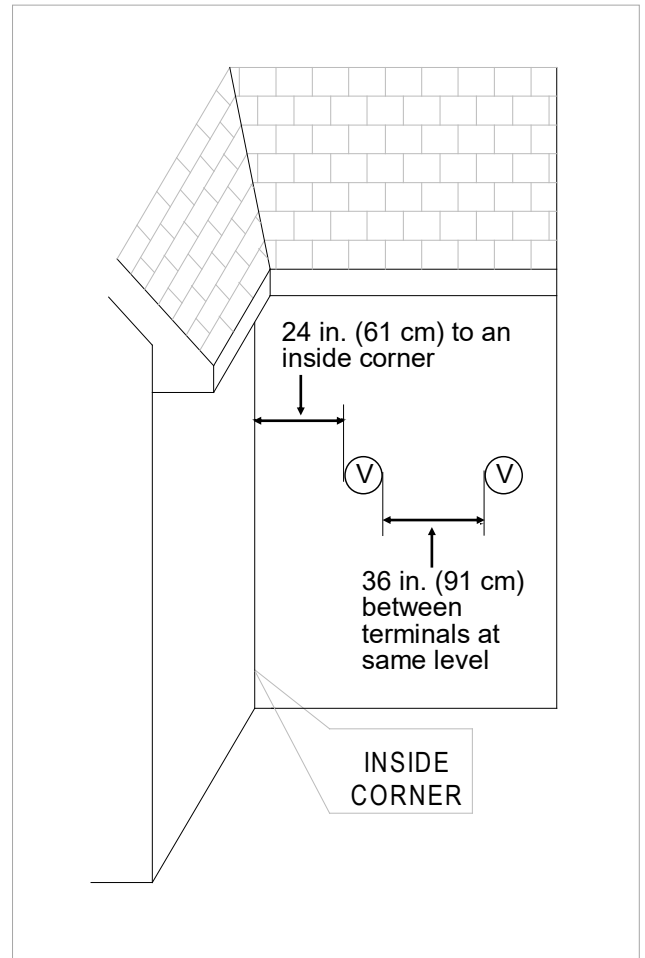


Fig 29. Inside Corner Clearances

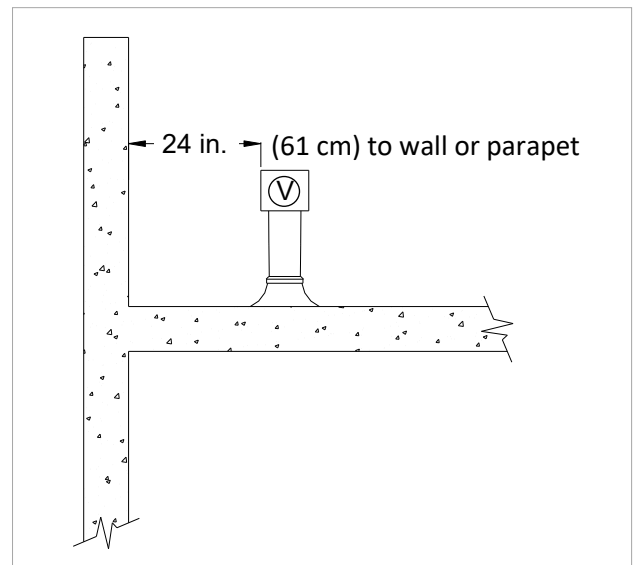


Fig 30. Wall or Parapet Clearances

Condensate Trap and Drain Pipe Installation Instructions

Install the Condensate Trap and Drain Pipe

Condensate must be drained to prevent malfunction, diagnostic code failures, or property damage. Condensate should be disposed according to local codes. Refer to the National Fuel Gas Code, ANSI Z223.1/NFPA 54, or the Natural Gas and Propane Installation Code, CSA B149.1 condensate disposal.

A condensate pump must be used if the condensate outlet is lower than the drain system.

Rinnai recommends installing a condensate neutralizer which allows condensate to flow through neutralizing media to raise the pH of the condensate to a level that will help prevent corrosion of the drain and public sewer system.

Ensure that the condensate drain does not freeze.

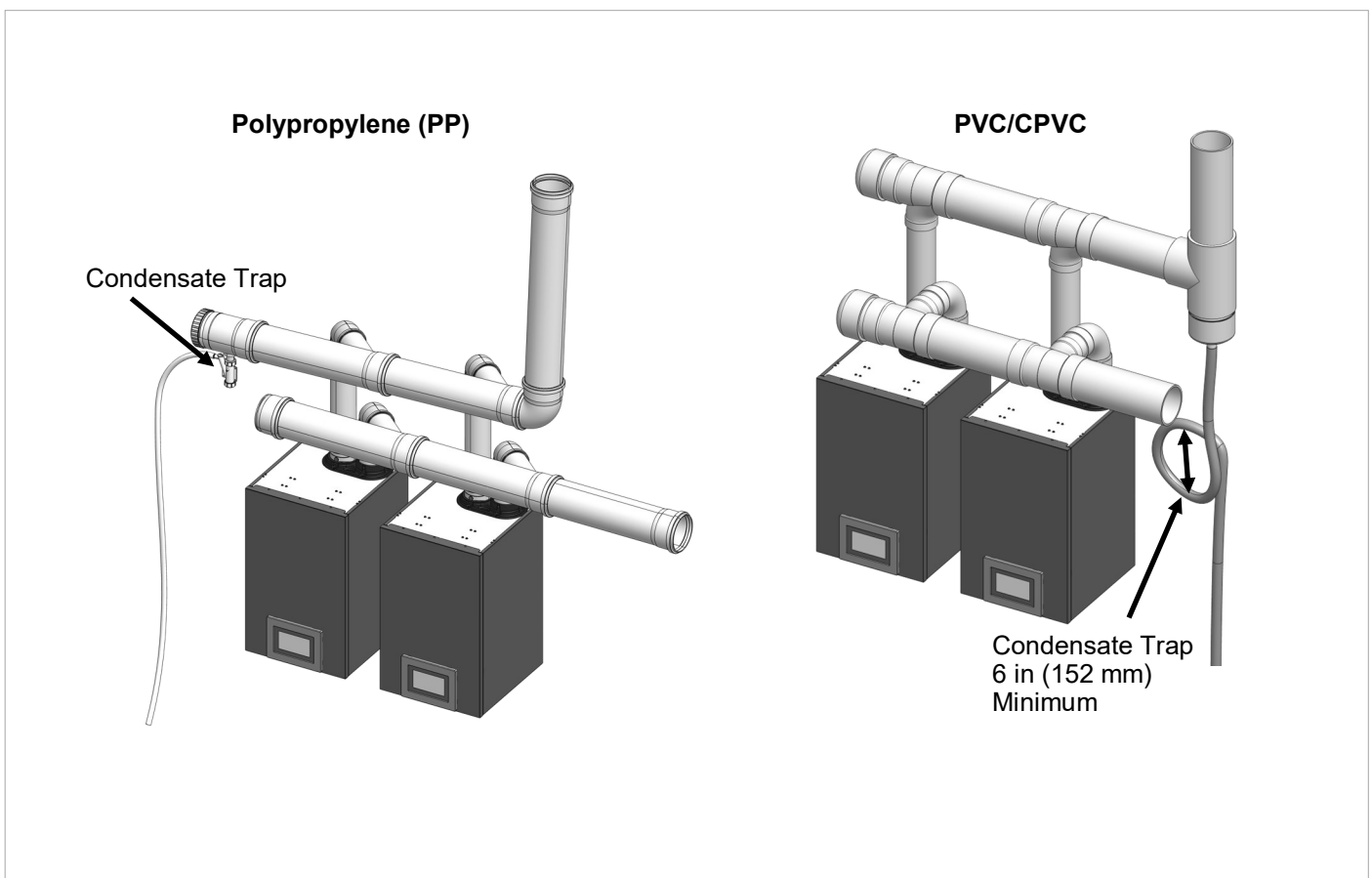


Fig 31 Condensate Trap Example

Final Checklist

<input type="checkbox"/>	Reference the Rinnai "Commercial Boiler Installation and Operation Manual" for proper installation of the Rinnai condensing boiler.
<input type="checkbox"/>	Clearances from the boiler unit are met.
<input type="checkbox"/>	Clearances from the exhaust termination(s) and the combustion air termination(s) are met.
<input type="checkbox"/>	Ensure you have used the correct venting products and that you have completely followed the venting manufacturer's installation instructions and these installation instructions.
<input type="checkbox"/>	Verify that the vent system does not exceed the maximum equivalent length allowed.
<input type="checkbox"/>	Explain to the customer the importance of not blocking the vent termination or air intake.
<input type="checkbox"/>	Explain to the customer the operation of the boiler, safety guidelines, maintenance, and warranty.
<input type="checkbox"/>	The installation conforms with local codes or, in the absence of local codes, with the <i>National Fuel Gas Code, ANSI Z223.1/NFPA 54</i> , or the <i>Natural Gas and Propane Installation Code, CSA B149.1</i> .
<input type="checkbox"/>	Verify that the boilers installed match the model numbers described in the manual.
<input type="checkbox"/>	Verify that the appropriate amount of combustion air has been provided.
<input type="checkbox"/>	Verify the parameter setting has been adjusted for the altitude/elevation of the installation location.
<input type="checkbox"/>	Leave this document taped to one of the boilers or give the entire document directly to the consumer.

If You Need Service

Contact Rinnai Customer Care at 1-800-621-9419.

Appendix A: Ubbink Condensing Common Vent System Installation and Assembly Instructions

Warranty and Liability

Claims for personal and material damages are excluded, if they are due to any or several of the following reasons:

- Use of the system not in accordance with the regulations.
- Improper assembly and incorrect operation.
- Faulty maintenance.
- Non-compliance with the assembly and operating instructions.
- Non-approved structural changes to the unit or to the individual components.
- Installation of components which are not part of the system.
- Subsequent damage, which occurred through further use of the system despite known defects.
- Intentional damage.

Preface

These installation instructions were compiled in accordance with the current state of technology and with the greatest care. They serve as a general guideline for the construction and operation of the Common Vent System as supplied by Rinnai America Corporation, manufactured by Ubbink.

General and Local Standards Information

When installing and operating the Common Vent System, the following valid standards and regulations must be complied with and adhered to:

- Local codes or, in the absence of local codes, with the National Fuel Gas Code, ANSI Z223.1/NFPA 54, or the Natural Gas and Propane Installation Code, CSA B149.1.
- Appliance Manufacturers Installation Instructions.
- Regulations on supervision of construction.
- Statutory provisions.
- Work must only be carried out by a trained and qualified professional.

Risk Guidelines

- All components of the Common Vent System are produced and built in accordance with valid standards, regulations and safety engineering rules.
- Risks to life and limb of the user or of the third party or impairments or damages to property can arise in the case of improper assembly or handling.
- To avoid such risks, the Common Vent System must be installed and used only for the designated intent as described in this manual.
- Deficiencies or damage of the Common Vent System must be addressed and repaired immediately.
- For roof or chimneys modifications, refer to the valid industrial safety regulations.
- These instructions must be complied with, unconditionally and at any time, when working on roofs and facades.

Transport and Storage

When transporting Common Vent System components, the following points must be complied with:

- Transport Common Vent System components in a clean, dry environment and only in its original packaging.
- If stored or transported at temperatures below 32°F (0°C), the Common Vent System components must be warmed up to 60°F (15°C) before the start of assembly.
- Components must be protected from solar emission. The Common Vent System components must be stored in a non UV-charged environment (for example, do not store components outside).
- The Common Vent System components must be stored in its original packaging.

Tools and Workmanship

Standard trade tools are sufficient for cutting and assembly of the Common Vent System components.

Following is a list of tools or equipment that may be necessary:

- Safety Glasses
- Screw Driver
- File or Sandpaper
- Gloves
- Fine Tooth Saw
- Weather Proof Sealant

Workmanship shall include the following:

- When cutting vent components, the cut must be straight. Cut edge shall be chamfered and all burrs removed before installation.
- All vent joints shall fully engage the male / female socket assembly.
- Installed vent system shall be clean and free of any foreign debris before operation.
- Vent system shall be rigidly supported as instructed in this manual and include the appropriate 3° slope.

General Assembly Instructions

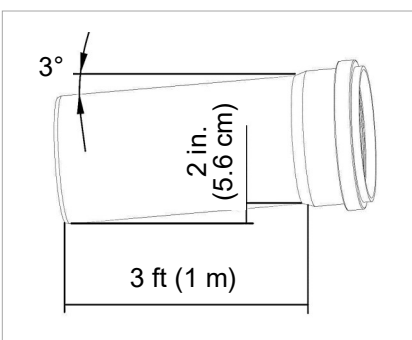


Fig 32. Correct Pitch

Correct Pitch

The pipes and formed parts must be installed at an angle of 3° incline towards the heating appliance to allow the condensate to dispose in accordance with regulations.

Note: 3° pitch equals a height difference of 2 in. (5.6 cm) per 3 ft (1 m).

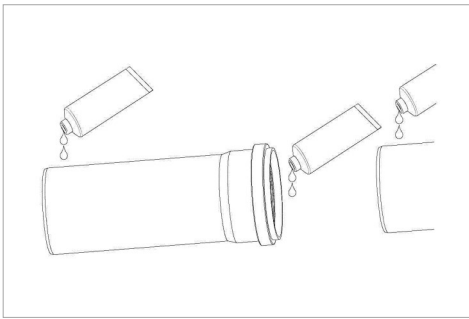


Fig 33. Apply Lubricant

Lubricant

- The seals and male ends of all common vent components must be lubricated before assembly. Use **ONLY** CENTROCERIN[®] lubricant or water to aid in the assembly of these vent components.
- Apply a thin layer of CENTROCERIN[®] lubricant to each seal before assembly.
- A tube CENTROCERIN[®] lubricant is packed with every kit assembly and available for separate purchase.
- 1 tube of CENTROCERIN[®] lubricant is sufficient for a 100 ft (1.7 m) common header installation.

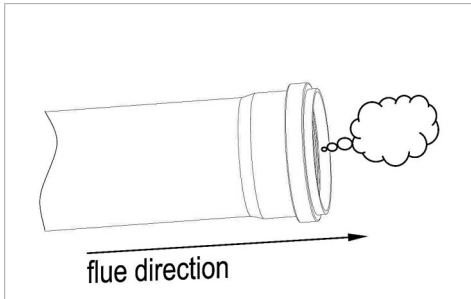


Fig 34 Flue Direction

Flue Direction

- The female end of the components in contact with the flue gasses must always point in the direction of the termination.
- It is imperative to maintain this flow direction for proper condensate flow and integrity of the seal/gasket.

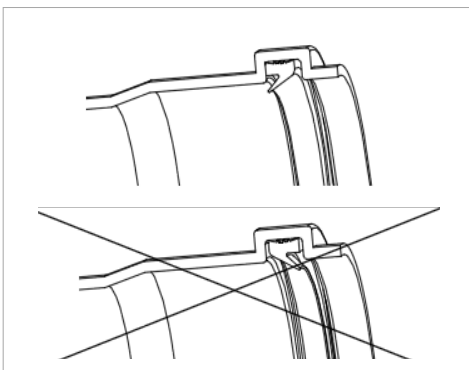


Fig 35. Seal Direction

Seal Direction and Assembly of Seals

Seals are pre-assembled in the vent components. If a seal is missing or damaged, this component should not be used or an appropriate seal must be installed.

- Use **ONLY** original seals. NEVER use fabricated or non common vent seals.
- Use only the appropriate nominal width and diameter seals.
- Confirm seal is installed in the appropriate direction (Fig 35).
- Seal and seal chamfer must remain clean and free of foreign debris before assembly.

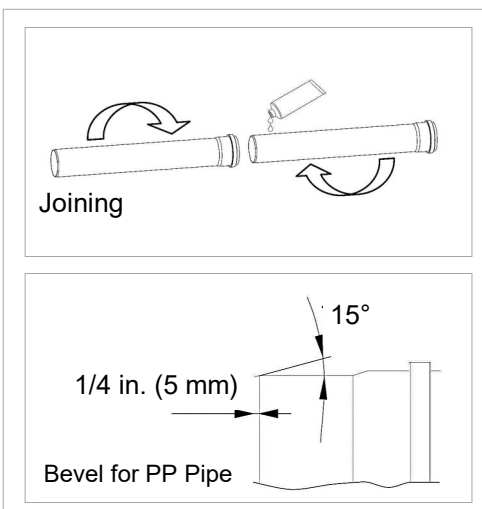


Fig 36. Joining

Joining, Disconnecting, Shortening and Chamfering

For measuring purposes, the seals can be removed from their chamber.

Note: Always reassemble the seals in the correct direction as indicated in the illustration.

- Lubricate the seals and/or male ends of the components with CENTROCERIN[®] lubricant or water and assemble the components using light, rotational movements. Entirely insert the male end into the female end.
- Inspect immediately the correct position of the seal as the system is produced out of translucent material.
- Pipes should always be shortened on the male end. Never cut or modify formed vent components such as elbows or collectors.
- Cut straight, perpendicular to the tube and chamfer the edges approximately 15° at 1/4 in. (5 mm).

Condensate and Condensate Drain

- Condensate is produced in the Common Vent System when appliances are operating.
- Condensate must be drained to prevent malfunction, equipment failure, or property damage. Condensate should be disposed according to local codes. Refer to the National Fuel Gas Code, ANSI Z223.1/NFPA 54, or the Natural Gas and Propane Installation Code, CSA B149.1 condensate disposal.
- The disposal for the condensate can be accommodated via the appliances and/or separate condensate outlets in the Common Vent System.
- A condensate trap must be installed at any drain point to prevent flue gasses from exiting.
- The condensate trap provided with the header (illustrated below) has an integrated valve that temporarily blocks condensate flow if high (wind) pressures cause a pressure rise in the vent system.
- The condensate trap integrated valve will also prevent trap from drying out if the system is off for a long period of time.
- The Ubbink condensate trap illustrated below does NOT require priming.
- Third party condensate valves (or a hose loop) DO need priming to be effective. Do not operate the appliances before the condensate traps are inspected and/or primed; otherwise, flue gasses can escape form the common vent system.
- All subsequent drains must have a minimum diameter of 1/2 in. (12 mm) and must be protected (if applicable) from freezing.

Instructions to be Complied With

When assembling the Common Vent System, the following points must be complied with:

- Correct fit of the seals.
- Complete use of the insertion depth of the pipes and formed parts.
- Assembly must be carried out with an incline of at least 3° (3/4 in. per foot or 5.6 cm/m), so that the condensate produced can flow away from the appliances in accordance with the regulations.
- Conversions or changes to the system components are not permissible without approval by Rinnai.
- After assembly of the Common Vent System, a visual inspection of all seals must be completed.
- Leave this manual for review with the end user and store it with the common header installation.



Fig 37. Condensate Drain Assembly

Final Installation Checklist

<input type="checkbox"/>	All vent components are secure and fully engaged.
<input type="checkbox"/>	All seals are correctly positioned and included at every joint.
<input type="checkbox"/>	All exhaust vent runs include a minimum of a 3° incline (3/4 in. per ft or 5.6 cm/m).
<input type="checkbox"/>	All condensate drains tubes are connected to a drain and comply with local codes.
<input type="checkbox"/>	All condensate traps have been primed.
<input type="checkbox"/>	There are no obstructions in the combustion air or exhaust vent runs.
<input type="checkbox"/>	Both intake and exhaust terminations are appropriately positioned and comply with the manufacturers installation instructions and local codes.
<input type="checkbox"/>	This manual and the “I-Series Condensing Solo Boiler Installation and Operation Manual” have been secured to the system or provided to the end user.

Bracket Clearances

All supports (such as wall brackets) on the external façade or spacer blocks in a shaft must be assembled in a maximum distance of 6 ft (2 m) (Fig 38). Where there is a bend, additional spacer blocks or wall brackets can be planned before and after the bend, depending on the local situation.

Inspection After Assembly

After assembly of a system chimney, the following points must be inspected:

- Carry out a visual seal inspection of the entire flue gas tract.
- The chimney is put into operation together with the heating appliance.
- Regular cleaning and maintenance in accordance with valid country-specific regulations.

Application Manufacturer’s Information

The manufacturer’s identification information as displayed below must be filled out and kept with the system chimney. The following points must be filled out below by the trained and qualified professional after release of the system:

Table 14

Installation date of the system chimney	
Number of entries (appliances)	
Nominal diameter of the selected system chimney	
Constructor of the chimney with full name	

Manufacturer identification: Ubbink/Centrotherm Centrotec Sustainable AG Verhuellweg 9, 6984AA Doesburg, The Netherlands. Mail: rolux@ubbink.nl

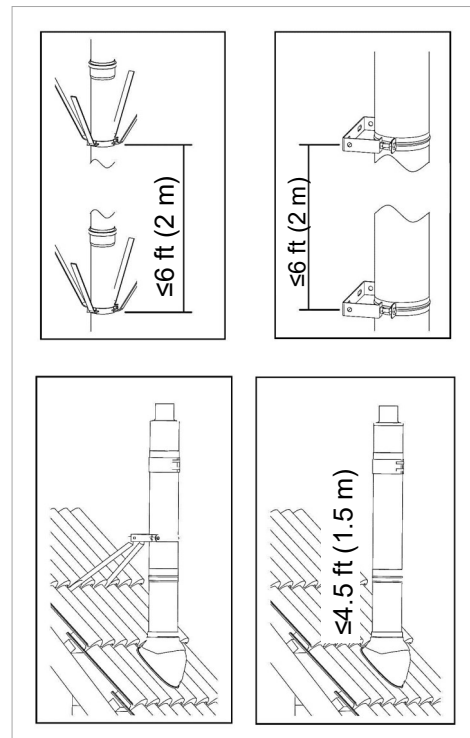


Fig 38. Brackets