

# 12 - INSTALLATION - CATEGORY IV: Vent and combustion air

## 12.1 - CATEGORY IV: Positive pressure condensing

An appliance that operates with a positive vent static pressure with a vent gas temperature that may cause condensate production in the vent.

## 12.2 - CATEGORY IV: Venting and air piping systems

**! WARNING!!!** The vent installation must be in accordance with part *Venting of Appliances*, of the latest edition of the *National Fuel Gas Code*, ANSI Z223.1/NFPA 54 or section, *Venting Systems and Air Supply for Appliances*, of the *CAN/CSA B149.1, Natural Gas and Propane Installation code* or applicable provisions of the local building codes. Improper venting can result in excessive levels of carbon monoxide which can result in severe personal injury or death!

**! WARNING!!!** All vent pipes must be mechanically fixed. Improper venting can result in excessive levels of carbon monoxide which can result in severe personal injury or death!

**! WARNING!!!** The exhaust vent and the air inlet lines, must be supported to prevent sagging. To do this, use a suitable pipe clamp to support the lines. Pipe clamps shall support the line every 3 ft (1 m). Pipe clamp shall be fixed in correspondance of a wall stud. Improper supporting can result in excessive levels of carbon monoxide which can result in severe personal injury or death!

**NOTICE!** The exhaust pipe must be pitched a minimum of a 1/4 inch per foot back to the heater (to allow drainage of condensate).

**NOTICE!** The vent system shall be installed so as to prevent the accumulation of condensate.

**NOTICE!** Due to the high efficiency of the heater it may discharge what looks like white smoke especially when the outside air temperature is cold. This is a simply water vapor, a purely natural phenomenon and not a reason for concern.

This heater requires a special vent system, designed for pressurized venting.

You must install air piping from outside to the heater air intake. The resultant installation is Direct Vent (sealed combustion).

The heater is to be used for either Direct Vent installation or for installation using room combustion air. When room air is considered, see Section 12.9.

Vent and air must terminate near one another and may be vented vertically through the roof or out a side wall, unless otherwise specified. You may use any of the vent/air piping methods from Figure 12-1 to Figure 12-6. Do not attempt to install this heater using any other means.

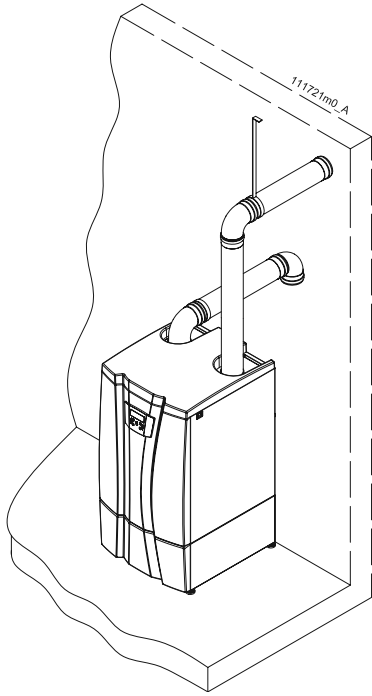
**! WARNING!!!** DO NOT mix components from different systems. The vent system could fail, causing leakage of flue products into the living space. Use only approved materials listed on Figures 12-7 and 12-8. Improper materials or mixing materials can result in excessive levels of carbon monoxide which can result in severe personal injury or death!

**! WARNING!!!** Use of cellular core PVC and CPVC or Radel for venting system is not allowed. Use of improper materials can result in excessive levels of carbon monoxide which can result in severe personal injury or death!

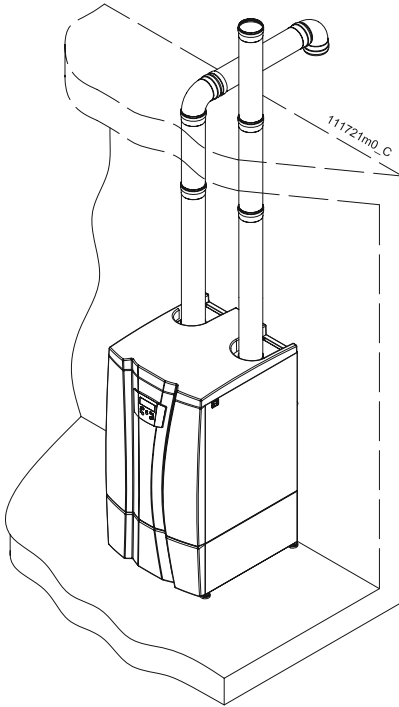
Be sure to locate the heater such that the vent and air piping can be routed through the building and properly terminated.

The vent/air piping lengths, routing and termination method must all comply with the methods and limits given in Section 12.3.

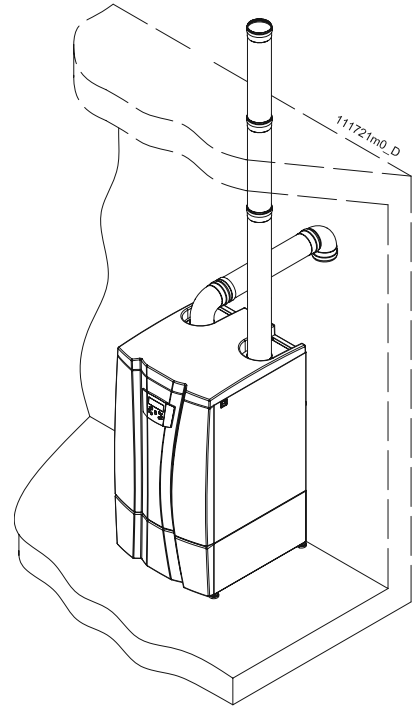
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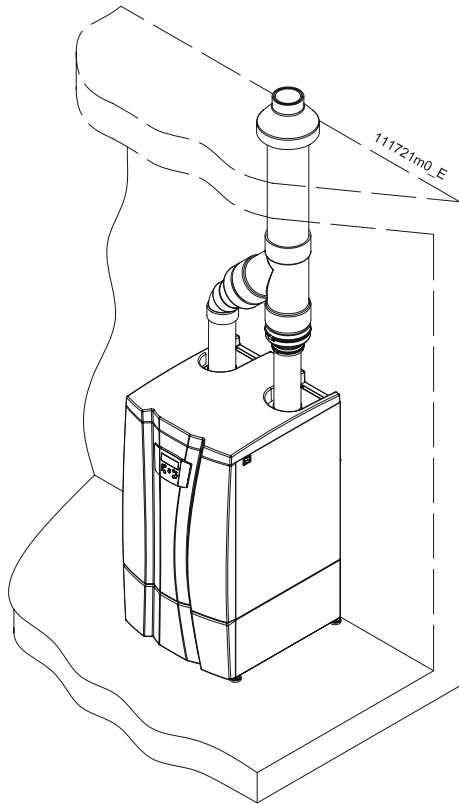
**Figure 12-1 Side wall two pipes (Direct venting).**



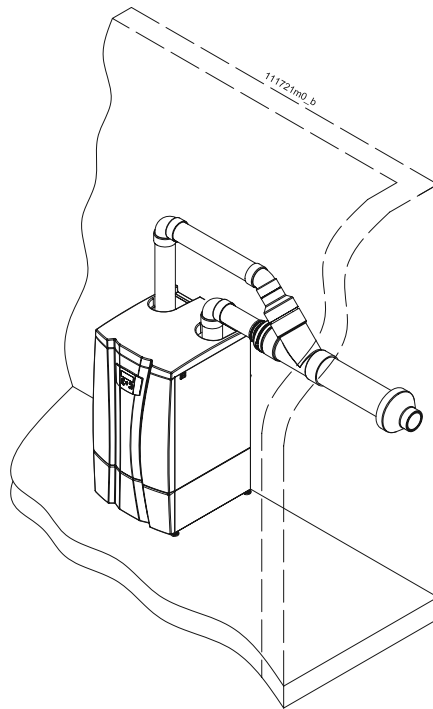
**Figure 12-2 Vertical two pipes (Direct Venting).**



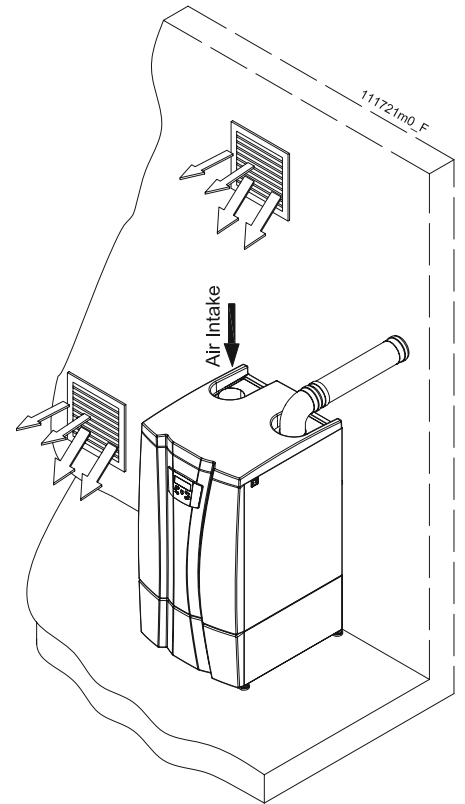
**Figure 12-3 Side wall air intake, vertical vent (Direct venting).**



**Figure 12-4 Vertical concentric (Direct venting).**



**Figure 12-5 Side wall concentric (Direct venting).**



**Figure 12-6 Side wall (or vertical in a roof) one pipe venting, combustion air from room (not Direct venting).**

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## 12.3 - Minimum / Maximum allowable combustion air and vent piping lengths

The maximum length of the two pipes vent system is 120 equivalent ft (Air intake plus flue exhaust). However, each single pipe can't be longer than 60 ft.

Each 45° elbow inserted in the venting system, has a loss of pressure equivalent to 3 ft of linear pipe.

Each 90° elbow inserted in the venting system, has a loss of pressure equivalent to 6 ft of linear pipe.

The minimum length of the venting system is 1 ft (305 mm).

## 12.4 - Install vent and combustion air piping

**! WARNING!!!** This heater 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 5.1.1 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 all applicable codes. Failure to provide a properly installed vent and air system will cause severe personal injury or death.

**! WARNING!!!** Using vent materials other than those listed in Figure 12-7 and Figure 12-8, failure to properly seal all seams and joints, mixing

of venting materials or failure to follow vent pipe and fittings manufacturer's instructions can result in personal injury, death or property damage.

**! WARNING!!!** Use of cellular core PVC and CPVC or Radel for venting system is not allowed. Use of improper materials can result in excessive levels of carbon monoxide which can result in severe personal injury or death!

**! WARNING!!!** Use only the materials listed in Figure 12-7 and Figure 12-8 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.

For installation in Canada, vent pipe system must be certified to ULC-S636 (see Figure 12-7).

Vent pipe materials and fittings must comply with the following standards			
Item	Material	Standard for installation in USA	Standard for installation in CANADA
Vent pipe	PVC schedule 40/80	ANSI/ASTM D2665	ULC-S636
	CPVC schedule 40/80	ANSI/ASTM F441	
	Polypropylene	ULC-S636	
	Stainless steel AL29-4C	UL 1738	
Vent fittings	PVC schedule 40	ANSI/ASTM D2466	
	PVC schedule 80	ANSI/ASTM D2467	
	CPVC schedule 80	ANSI/ASTM F439	
	Polypropylene	ULC-S636	
	Stainless steel AL29-4C	UL 1738	
Pipe cement/primer	PVC	ANSI/ASTM D2564	
	CPVC	ANSI/ASTM F493	

**! WARNING!!!** Use of cellular core PVC, CPVC, and Radel for venting system is not allowed

Figure 12-7 Approved vent materials

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Approved vent manufacturers and items				
Item	Family of the Material	Manufacturer/supplier	Applicable to models	Manufactur. Part Number
3" Concentric roof or wall terminal	PVC	IPEX (System 636)	199	196006
4" Concentric roof or wall terminal	PVC	IPEX (System 636)	399, 500	196021
3" Concentric roof or wall terminal	CPVC	IPEX (System 636)	199	197009
4" Concentric roof or wall terminal	CPVC	IPEX (System 636)	399, 500	197021
3" Two (and single) pipes roof or wall terminal (90° elb.)	PVC	IPEX (System 636)	199	196025
4" Two (and single) pipes roof or wall terminal (90° elb.)	PVC	IPEX (System 636)	399, 500	196124
3" Two (and single) pipes roof or wall terminal (90° elb.)	CPVC	IPEX (System 636)	199	197201
4" Two (and single) pipes roof or wall terminal (90° elb.)	CPVC	IPEX (System 636)	399, 500	197202
3" Wall termination kit	PVC	IPEX (System 636)	199	081219
3" Low profile wall termination kit	PVC	IPEX (System 636)	199	196985
4" Low profile wall termination kit	PVC	IPEX (System 636)	399, 500	196986
6" Two (and single) pipes roof or wall terminal (90° elb.)	CPVC	IPEX (System 636)	750, 1000	197203
3" Bird screen	PVC/CPVC	IPEX (System 636)	199	196051
4" Bird screen	PVC/CPVC	IPEX (System 636)	399, 500	196052
6" Bird screen	PVC/CPVC	IPEX (System 636)	750, 1000	196090
3" (80mm) Two (and single) pipes roof or wall terminal (90° elb.)	Polypropylene	Centrotherm (Innoflue System)	199	ISELL0387UV
4" (110mm) Two (and single) pipes roof or wall terminal (90° elb.)	Polypropylene	Centrotherm (Innoflue System)	399, 500	ISELL0487UV
6" (160mm) Two (and single) pipes roof or wall terminal (90° elb.)	Polypropylene	Centrotherm (Innoflue System)	750, 1000	ISELL0687UV
3" (80mm) Heater adapter	Polypropylene	Cosmogas	199	62617332
4" (110 mm) Heater adapter	Polypropylene	Cosmogas	399, 500	62617333
6" (160mm) Heater adapter	Polypropylene	Cosmogas	750, 1000	62617334
3" (80mm) Bird screen	Polypropylene	Centrotherm (Innoflue System)	199	IASPP03
4" (110mm) Bird screen	Polypropylene	Centrotherm (Innoflue System)	399, 500	IASPP04
6" (160mm) Bird screen	Polypropylene	Centrotherm (Innoflue System)	750, 1000	IASSS06
3" Two (and single) pipes roof or wall terminal (90° elb.)	Stainless steel	Duravent (FasNSeal)	199	FSELB9003
4" Two (and single) pipes roof or wall terminal (90° elb.)	Stainless steel	Duravent (FasNSeal)	399, 500	FSELB9004
6" Two (and single) pipes roof or wall terminal (90° elb.)	Stainless steel	Duravent (FasNSeal)	750, 1000	FSELB9006
3" Heater adapter	Stainless steel	Duravent (FasNSeal)	199	FSA-80MM3
4" Heater adapter	Stainless steel	Duravent (FasNSeal)	399, 500	FSA-100MM4
6" Heater adapter	Stainless steel	Duravent (FasNSeal)	750, 1000	FSA-160MM6
3" Bird screen	Stainless steel	Duravent (FasNSeal)	199	FSBS3
4" Bird screen	Stainless steel	Duravent (FasNSeal)	399, 500	FSBS4
6" Bird screen	Stainless steel	Duravent (FasNSeal)	750, 1000	FSBS6

Figure 12-8 Approved vent manufacturers and items

### 12.5 - Air inlet pipe materials:

**! WARNING!!!** The air inlet pipe(s) must be sealed. Improper sealed can result in excessive levels of carbon monoxide which can result in severe personal injury or death!

Choose acceptable combustion air inlet pipe materials from the following list:

- PVC, CPVC or ABS
- AL29-4C, stainless steel material to be sealed to specification of its manufacturer.
- Polypropylene material to be sealed to specification of its manufacturer.

**! WARNING!!!** Using air intake materials other than those specified, mixing the specified materials, failure to properly seal all seams and joints or failure to follow the manufacturer's instructions can result in flue gas recirculation, spillage of flue products and carbon monoxide emissions causing severe personal injury or death.

**NOTICE!** Polypropylene and stainless steel pipe may require an adapter (not provided) to transition between the air inlet connection on the appliance and the air inlet pipe.

**NOTICE!** The use of 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.

**NOTICE!** Combustion air piping must be supported per guidelines listed in the "National Mechanical code", section 305, table 305.4 or local codes dictate.

### 12.5.1 - Sealing of PVC, CPVC or ABS air inlet pipe

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 or ABS air inlet pipe should use a silicone sealant MOMENTIVE - RTV 106, to ensure a proper seal at the appliance connection and the air inlet cap connection. ABS should use a screw type clamp to seal the pipe to 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.

**! WARNING!!!** 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.

**! WARNING!!!** All air intake pipes must be glued, properly supported and pitched a minimum of a 1/4 inch per foot out to the heater (to allow drainage of water into the appliance). Failure to follow this warning could result in excessive levels of carbon monoxide or a fire, which can result in severe personal injury or death!

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## 12.6 - PVC/CPVC vent piping materials

**! WARNING!!!** Use only the materials listed in Figures 12-7 and 12-8 for vent pipe, and fittings. **DO NOT** mix 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.

**! WARNING!!!** This appliance requires a special venting system. The vent pipe must be connected to the heater following Section 12.6.1. 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!!!** Do not insulate PVC/CPVC exhaust pipe nor install into an enclosure, closet, alcove or any other obstruction thereby preventing the cooling of the exhaust pipe. Failure to follow this warning could result in excessive levels of carbon monoxide or a fire, which can cause severe personal injury or death!

**! WARNING!!!** Improper installation of PVC or CPVC systems may result in excessive levels of carbon monoxide or a fire, which can cause severe personal injury or death!

**! WARNING!!!** All 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 heater (to allow drainage of condensate). Failure to follow this warning could result in excessive levels of carbon monoxide or a fire, which can result in severe personal injury or death!

**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.

For installation in Canada, vent pipe system must be certified to ULC-S636 (see Figures 12-7).

**NOTICE!** Installation of a PVC/CPVC vent system should adhere to the PVC/CPVC vent manufacturer's installation instructions supplied with the vent system.

### 12.6.1 - Installing PVC/CPVC 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 heater to vent or air termination. Do not exceed the lengths given in Section 12.3.
2. Cut pipe to the required lengths and deburr the inside and outside of the pipe ends.
3. Bevel 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).

#### Connection of the the vent or air piping to the heater adapters

5. Dry fit vent or air piping to ensure proper fit up before assembling pipes to the heater adapters. The pipe should go completely into the adapter to ensure proper sealing after sealant is applied.
  - a. Handle adapters and pipes carefully to prevent contamination of surfaces.

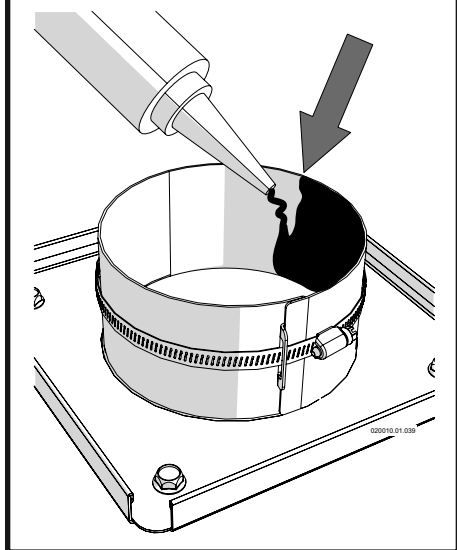
- b. Apply a liberal even coat of MOMENTIVE - RTV 106 high temperature silicone (or equivalent) to the the pipe end approximately 1/2" beyond the socket depth.
- c. While the MOMENTIVE - RTV 106 high temperature silicone is still wet, insert the pipe into the heater adapter. **NOTICE!** If voids are present, sufficient MOMENTIVE - RTV 106 was not applied and joint could be defective.
- d. Tight the clamp to mechanically secure the joint

#### Connection between pipes and /or elbows and/or terminals of the the vent or air piping

6. 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.
7. 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. **NOTICE!** 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.

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**CAUTION!!!** Apply a liberal even coat of **MOMENTIVE - RTV 106** high temperature silicone (or equivalent) to the internal side of the heater adapter (item "B" and "P" fig.12-9)



## 12.6.2 - PVC/CPVC air intake connection

**Combustion Air Intake connection (see Figure 12-9 Item "P").** This connection is used to provide combustion air directly to the heater from outdoors. Combustion air piping must be supported per guidelines listed in the National Mechanical Code, Section 305, Table 305.4 or as local codes dictate. To connect a PVC/CPVC pipe to the air intake connection proceed as follow while referring to Figure 12-9:

1. Prepare the connection between adapter "P" and pipe "N" like described on Section 12.6.1;
2. Insert the air inlet PVC/CPVC pipe, for 3" into the adapter "P";
3. Tighten the clamp "F" to mechanically secure the adapter "P" to the pipe.

## 12.6.3 - PVC/CPVC vent connection

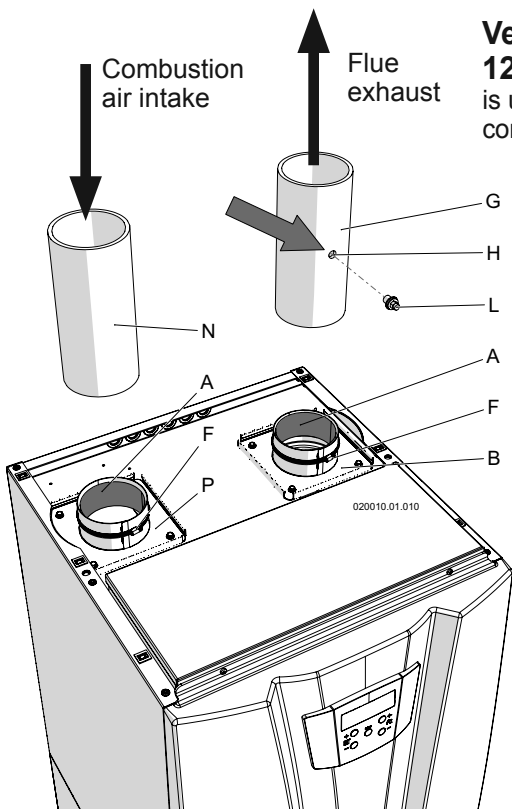
**Vent connection (see Figure 12-9 Item "C").** This connection is used to provide a passageway for conveying combustion gas to the

outside. Vent piping must be supported per the National Building Code, Section 305, Table 305.4 or as local codes dictate.

To connect a PVC/CPVC pipe to the vent connection proceed as follow while referring to Figure 12-9:

1. Prepare the connection between adapter "B" and pipe "G" like described on Section 12.6.1;
2. Insert the flue exhaust PVC/CPVC pipe, for 3" into the adapter "B";
3. Tighten the clamp "F" to mechanically secure the adapter "B" to the pipe.

**WARNING!!!** Do not insulate PVC/CPVC exhaust pipe nor install into an enclosure, closet, alcove or any other obstruction thereby preventing the cooling of the exhaust pipe. Failure to follow this warning could result in excessive levels of carbon monoxide or a fire, which can result in severe personal injury or death!



- A = MOMENTIVE - RTV 106 high temperature silicone (or equivalent) (Field provided)
- B = Flue exhaust adapter for PVC/CPVC pipe
- F = mechanically secure clamp
- G = PVC/CPVC exhaust pipe (Field provided)
- H = Combustion analization probe (Field installed)
- L = cap (Field provided)
- N = PVC/CPVC air inlet pipe (Field provided)
- P = Air intake adapter for PVC/CPVC pipe

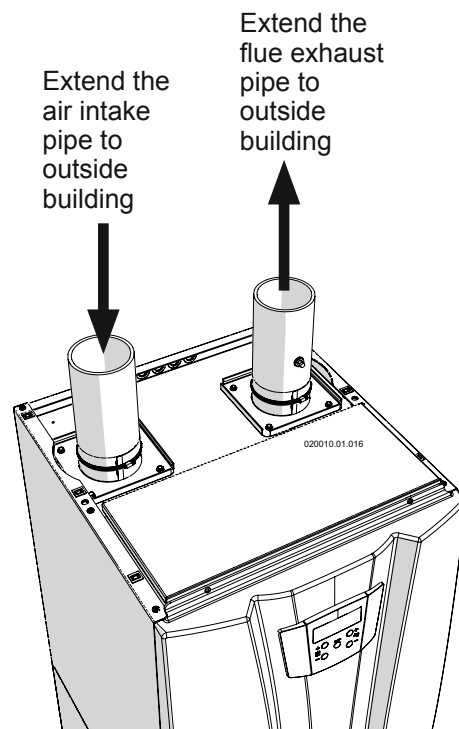


Figure 12-9 PVC/CPVC air intake/vent connection

Figure 12-10 PVC/CPVC air intake/Vent connection correctly in place

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## 12.7 - Stainless steel vent piping materials

**! WARNING!!!** Use only the materials, vent systems, and terminations listed in Figures 12-7 and 12-8. **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.

**! WARNING!!!** This appliance requires a special venting system. The field provided vent heater adapter (Figure 12-11, item “B”) must be connected to the heater following Section 12.7.2. Failure to follow this warning could result in fire, personal injury, or death.

**! WARNING!!!** Improper installation of Stainless steel systems may result in injury or death.

**! WARNING!!!** Use only water-based lubricants on joints. Never use hydrocarbons-based lubricants because they would destroy gaskets. Failure to follow this warning could result in excessive levels of carbon monoxide, which can result in severe personal injury or death!

**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.

**NOTICE!** For installation in Canada, vent pipe system must be certified to ULC-S636 (see Figure 12-7).

**NOTICE!** All vent pipes connections must be secured following manufacturer instruction, properly supported, and the exhaust must be pitched a minimum of a 1/4 inch per foot back to the heater (to allow drainage of condensate).

**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 Figure 12-8 for approved vent adapters.

### 12.7.1 - Stainless steel air intake connection

#### Combustion Air Intake connection (see Figure 12-11 Item “M”).

This connection is used to provide combustion air directly to the heater from outdoors. Combustion air piping must be supported per guidelines listed in the National Mechanical Code, Section 305, Table 305.4 or as local codes dictate.

To connect a stainless steel pipe to the air intake connection proceed as follows while referring to Figure 12-11:

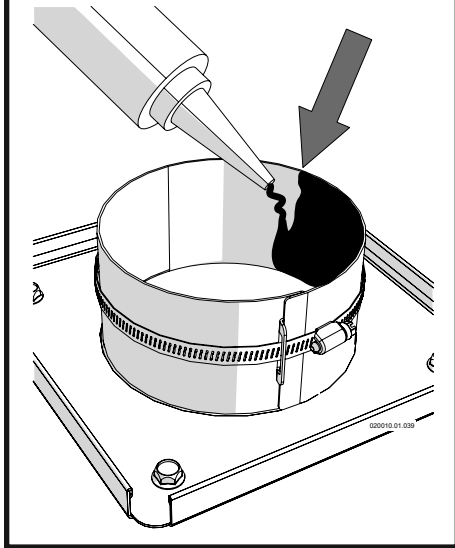
1. Dry fit adapter “R” and heater connection “P” to ensure proper fit up before assembling the adapter to the heater. The adapter “R” should go completely into the heater connection to ensure proper sealing after sealant is applied.
  - a. Handle adapters “R” and heater adapter “P” carefully to prevent contamination of surfaces.
  - b. Apply a liberal even coat of MOMENTIVE - RTV 106 high temperature silicone (or equivalent) to the adapter “R” approximately 2” beyond the socket depth.
  - c. While the MOMENTIVE - RTV 106 high temperature silicone is still wet, insert the adapter “R” into the heaterconnection “P”.

**NOTICE!** If voids are present, sufficient MOMENTIVE - RTV 106 was not applied and joint could be defective.
  - d. Tight the clamp to mechanically secure the joint
2. Insert air intake pipe “N”, into adapter “R”, following instruction of stainless steel pipe manufacturer.



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**CAUTION!!!** Apply a liberal even coat of **MOMENTIVE - RTV 106** high temperature silicone (or equivalent) to the internal side of the heater adapter (item "B" and "P" fig.12-11)



## 12.7.2 - Stainless steel vent connection

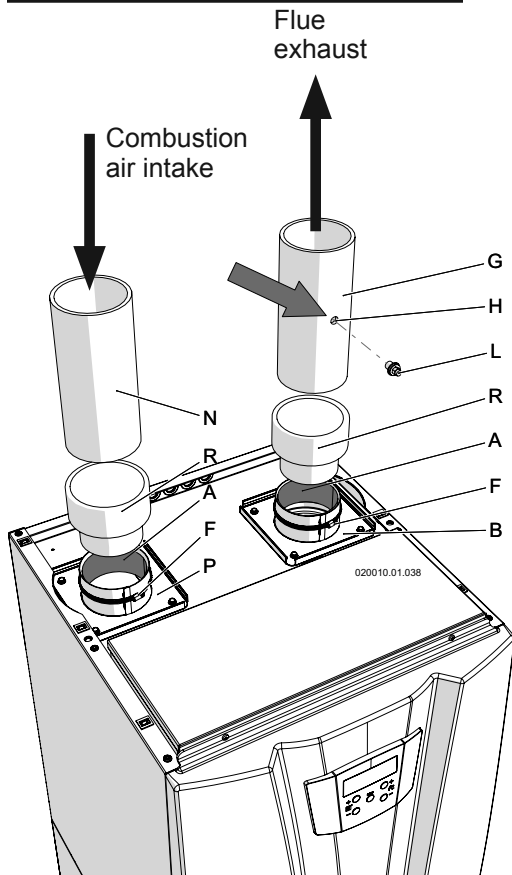
**Vent connection (Figure 12-11 item "C")** is used to provide a passageway for conveying combustion gases to the outside. Vent piping must be supported per the National Building Code, Section 305, Table 305.4 or as local codes dictate.

To connect a stainless steel pipe to the vent connection proceed as follows while referring to Figure 12-11:

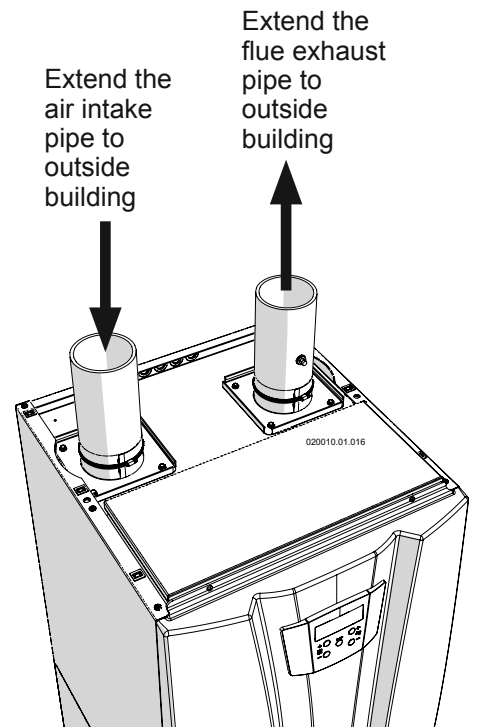
1. Dry fit adapter "R" to ensure proper fit up before assembling adapter to the heater connection "B". The adapter "R" should go completely into the heater adapter to ensure proper sealing after sealant is applied.
  - a. Handle adapters "R" and heater connection "B" carefully to prevent contamination of surfaces.

- b. Apply a liberal even coat of **MOMENTIVE - RTV 106** high temperature silicone (or equivalent) to the adapter "R" approximately 2" beyond the socket depth.
- c. While the **MOMENTIVE - RTV 106** high temperature silicone is still wet, insert the adapter "R" into the heater connection "B". **NOTICE!** If voids are present, sufficient **MOMENTIVE - RTV 106** was not applied and joint could be defective.
- d. Tight the clamp to mechanically secure the joint

2. Insert vent pipe "G", into adapter "R", following instruction of stainless steel pipe manufacturer.



**Figure 12-11 Stainless steel air intake/vent connection**



**Figure 12-12 Stainless steel air intake/vent connection correctly in place**

### 12.8 - Polypropylene vent piping materials

**! WARNING!!!** Use only the materials listed in Figures 12-7 and 12-8 for vent pipe, and fittings. **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.

**! WARNING!!!** This appliance requires a special venting system. The field provided vent fittings must be connected to the heater following Section 12.8.2. Failure to follow this warning could result in fire, personal injury, or death.

**! WARNING!!!** Do not insulate polypropylene exhaust pipe nor install into an enclosure, closet, alcove or any other obstruction thereby preventing the cooling of the exhaust pipe. Failure to follow this warning could result in excessive levels of carbon monoxide or a fire, which can result in severe personal injury or death!

**! WARNING!!!** Improper installation of Polypropylene systems may result in injury or death.

**! WARNING!!!** Use only water-based lubricants on joints. Never use hydrocarbons-based lubricants because they would destroy gaskets. Failure to follow this warning could result in excessive levels of carbon monoxide, which can result in severe personal injury or death!

**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.

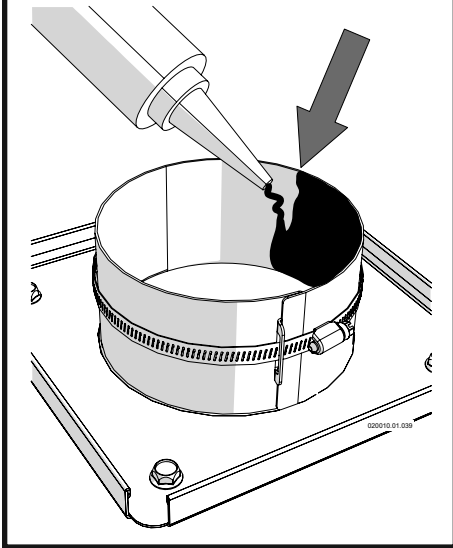
For installation in Canada, vent pipe system must be certified to ULC-S636 (see Figure 12-7).

**NOTICE!** All vent pipes connections must be secured following manufacturer instruction, properly supported, and the exhaust must be pitched a minimum of a 1/4 inch per foot back to the heater (to allow drainage of condensate).

**NOTICE!** Installation of a Polypropylene vent system should adhere to the polypropylene vent manufacturer's installation instructions supplied with the vent system.

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**CAUTION!!!** Apply a liberal even coat of **MOMENTIVE - RTV 106 high temperature silicone (or equivalent)** to the internal side of the heater adapter (item "B" and "P" fig.12-13)



## 12.8.1 - Polypropylene air intake connection

Combustion Air Intake connection (see Figure 12-13 Item "M") is used to provide combustion air directly to the heater from outdoors. Combustion air piping must be supported per guidelines listed in the National Mechanical Code, Section 305, Table 305.4 or as local codes dictate.

To connect a polypropylene pipe to the air intake connection proceed as follows while referring to Figure 12-13:

1. install heater adapter "P" (Field provided) above exit "M" using gasket "D" and bolts "E".
2. Insert vent pipe "N", into adapter "P", following instruction of polypropylene pipe manufacturer.

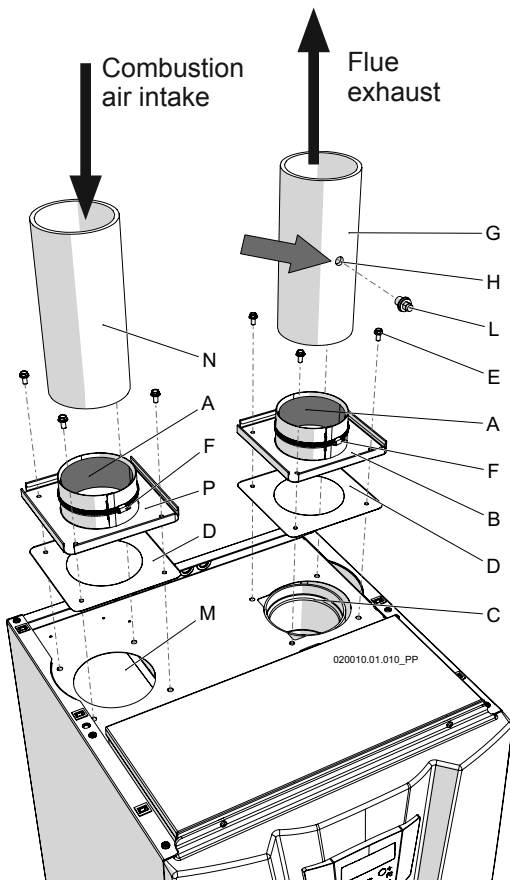
## 12.8.2 - Polypropylene vent connection

Vent connection (Figure 12-13 item "C") is used to provide a passageway for conveying combustion gases to the outside. Vent piping must be supported per the National Building Code, Section 305, Table 305.4 or as local codes dictate.

To connect a polypropylene pipe to the vent connection proceed as follows while referring to Figure 12-13:

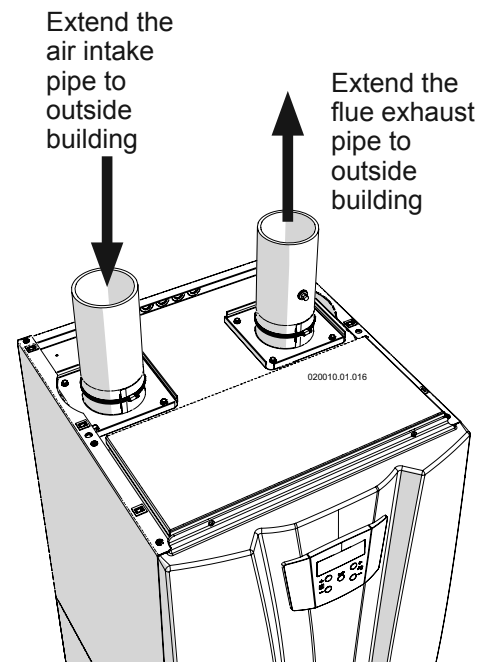
1. install heater adapter "B" (Field provided) above exit "C" using gasket "D" and bolts "E".
2. Insert vent pipe "G", into adapter "B", following instruction of polypropylene pipe manufacturer.

**WARNING!!!** Do not insulate polypropylene exhaust pipe nor install into an enclosure, closet, alcove or any other obstruction thereby preventing the cooling of the exhaust pipe. Failure to follow this warning could result in excessive levels of carbon monoxide or a fire, which can result in severe personal injury or death!



- A = MOMENTIVE - RTV 106 high temperature silicone (or equivalent) (Field provided)
- B = Flue exhaust adapter for PVC/CPVC pipe
- C = Flue exhaust connection
- D = Gasket
- E = Fixing screws
- F = Mechanically secure clamp
- G = PVC/CPVC exhaust pipe (Field provided)
- H = Combustion analization probe (Field installed)
- L = Cap (Field provided)
- N = PVC/CPVC air inlet pipe (Field provided)
- P = Air intake adapter for PVC/CPVC pipe

**Figure 12-13 Polypropylene air intake/vent connection**



**Figure 12-14 Polypropylene air intake/vent connection correctly in place**

# 12 - INSTALLATION - CATEGORY IV: Vent and combustion air

## 12.9 - Single pipe vent (not sealed combustion)

For heaters for connection to gas vents or chimneys, vent installations shall be in accordance with "Venting of Equipment," of the National Fuel Gas Code, ANSI Z223.1/NFPA 54, or "Venting Systems and Air Supply for Appliances," of the Natural Gas and Propane Installation Code, CAN/CSA B149.1, or applicable provisions of the local building codes.

**! WARNING!!!** When utilizing the single pipe vent 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 (see section 5.1).

Failure to follow this warning could result in excessive levels of carbon monoxide, which can cause severe personal injury or death!

Commercial applications utilizing this heater may be installed with a single pipe carrying the flue products to the outside while using combustion air from the equipment room. In this case the following conditions and considerations must be followed.

**NOTICE!** There will be a noticeable increase in the noise level during normal operation from the inlet air opening.

**NOTICE!** Vent system and terminations must comply with the venting instructions set forth in Sections 12.6, 12.7 and 12.8.

**! WARNING!!!** Use only the materials, vent systems, and terminations listed in Figures 12-7 and 12-8. 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.

**! WARNING!!!** Fire danger due to flammable materials or liquids. Do not store flammable materials and liquids in the immediate vicinity of the heater.

**! WARNING!!!** Heater must be clear and free from combustible materials, gasoline and other flammable vapors and liquids, and corrosive liquids and vapors. Never use chlorine and hydrocarbon containing chemicals (such as spray chemicals, solution and cleaning agents, paints, glues etc.) in the vicinity of the heater. Do not store and use these chemicals in the heater room. Avoid excessive dust formation and build-up. Failure to comply could result in fire, severe personal injury, death, or substantial property damage.

**! WARNING!!!** Where exhaust fans, clothes dryers, and kitchen ventilation systems interfere with the operation of appliances, makeup air shall be provided. Failure to follow this warning could result in excessive levels of carbon monoxide, which can cause severe personal injury or death!

**NOTICE!** For installation in Canada, vent pipe system must be certified to ULC-S636 (see Table 12-7).

**NOTICE!** All vent pipes connections must be secured following manufacturer instruction, properly supported, and the exhaust must be pitched a minimum of a 1/4 inch per foot back to the heater (to allow drainage of condensate).

**NOTICE!** Vent pipe system shall be installed in a way to prevent accumulation of condensate.

# 12 - INSTALLATION - CATEGORY IV: Vent and combustion air

## 12.9.1 - Determine location

Locate the vent termination using the following guidelines:

1. The total length of piping for vent must not exceed the limits given in the Section 12.3.
2. You must consider the surroundings when terminating the vent:
  - a. Position the vent termination where vapors will not damage nearby shrubs, plants or air conditioning equipment or be objectionable.
  - b. The flue products will form a noticeable plume as they condense in cold air. Avoid areas where the plume could obstruct window views.
  - c. Prevailing winds could cause freezing of condensate and water/ice buildup where flue products impinge on building surfaces or plants.
  - d. Avoid possibility of accidental contact of flue products with people or animals.
  - e. Do not locate the terminations where wind eddies could affect performance or cause recirculation, such as inside building corners, near adjacent buildings or surfaces, window wells, stairwells, alcoves, courtyards, or other recessed areas.
  - f. Do not terminate above any door or window. Condensate can freeze, causing ice formations.
  - g. Locate or guard vent to prevent condensate damage to exterior finishes.
3. The vent piping must terminate in an elbow pointed outward as shown in Figures 12-15 or 12-16 or in a roof as shown in Figure 12-22.



### **WARNING!!!**

**Do not exceed the maximum lengths of the outside vent piping shown in Figures 12-15, 12-16 or 12-22. Excessive length exposed to the outside could cause freezing of condensate in the vent pipe, resulting in potential heater shutdown.**

4. Maintain clearances as expected by "Venting of Equipment," of the National Fuel Gas Code, ANSI Z223.1/NFPA 54, or "Venting Systems

and Air Supply for Appliances" of the Natural Gas and Propane Installation Code, CAN/CSA B149.1, or applicable provisions of the local building codes.

Also maintain the following:


- a. Vent must terminate:
  - At least 6 feet from adjacent walls.
  - No closer than 12 inches below roof overhang.
  - At least 7 feet above any public walkway.
  - At least 3 feet above any forced air intake within 10 feet.
  - No closer than 4 feet below or horizontally from any door or window or any other gravity air inlet.
- b. Do not terminate closer than 4 feet horizontally from any electric meter, gas meter, regulator, relief valve, or other equipment. Never terminate above or below any of these within 4 feet horizontally. **Item unique to CANADA: vent system shall terminate at least 6 ft from electrical and gas meters.**
5. Locate termination so it is not likely to be damaged by foreign objects, such as stones or balls, or subject to buildup of leaves or sediment.


# 12 - INSTALLATION - CATEGORY IV: Vent and combustion air

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## 12.10 - Sidewall termination - Two pipes

### 12.10.1 - Vent/air termination

 **WARNING!!!** A gas vent extending through an exterior wall shall not terminate adjacent to a wall or below building extensions such as eaves, parapets, balconies, or decks. Failure to comply could result in severe personal injury, death, or substantial property damage.

 **WARNING!!!** Do not connect any other appliance to the vent pipe or multiple heaters to a common vent pipe. Failure to comply could result in severe personal injury, death, or substantial property damage.

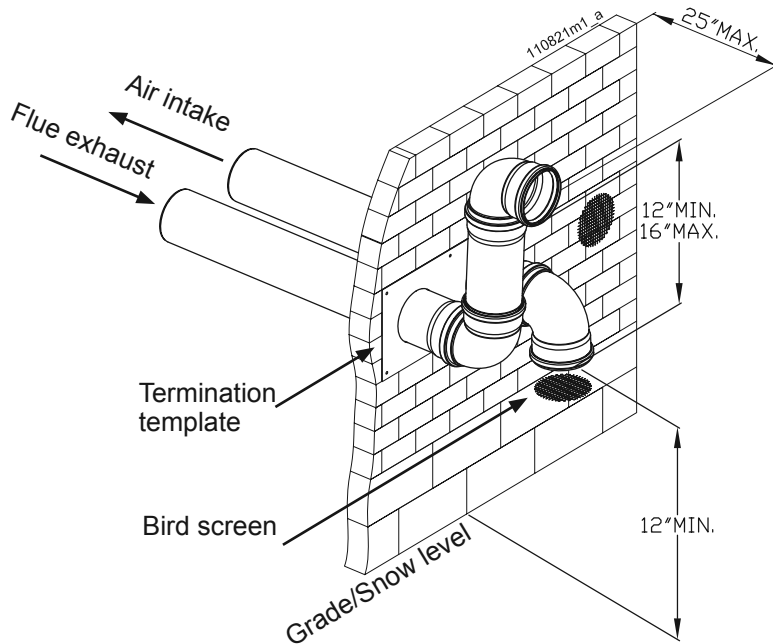
**NOTICE!** Installation must comply with local requirements and with the National Fuel Gas Code, ANSI Z223.1 for U.S. installations or CSA B149.1 for Canadian installations.

### 12.10.2 - Determine location

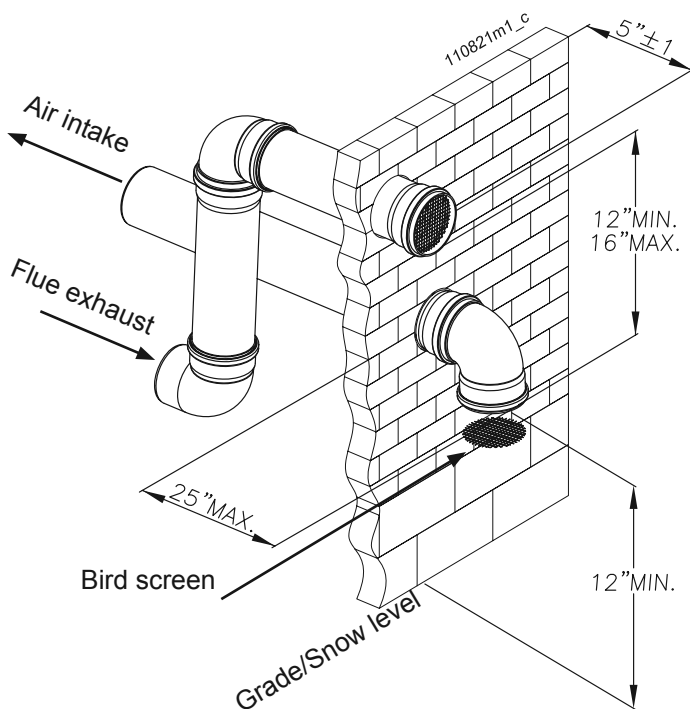
Locate the vent/air terminations using the following guidelines:

1. The total length of piping for vent or air must not exceed the limits given in the Section 12.3.
2. You must consider the surroundings when terminating the vent and air:
  - a. Position the vent termination where vapors will not damage nearby shrubs, plants or air conditioning equipment or be objectionable.
  - b. The flue products will form a noticeable plume as they condense in cold air. Avoid areas where the plume could obstruct window views.
  - c. Prevailing winds could cause freezing of condensate and water/ice buildup where flue products impinge on building surfaces or plants.
  - d. Avoid possibility of accidental contact of flue products with people or animals.
  - e. Do not locate the terminations where wind eddies could affect performance or cause recirculation, such as inside building corners, near adjacent buildings or surfaces, window wells, stairwells, alcoves, courtyards, or other recessed areas.
  - f. Do not terminate above any door or window. Condensate can freeze, causing ice formations.
  - g. Locate or guard vent to prevent condensate damage to exterior finishes.

# 12 - INSTALLATION - CATEGORY IV: Vent and combustion air



**Figure 12-15 Two pipes sidewall termination of air and vent**



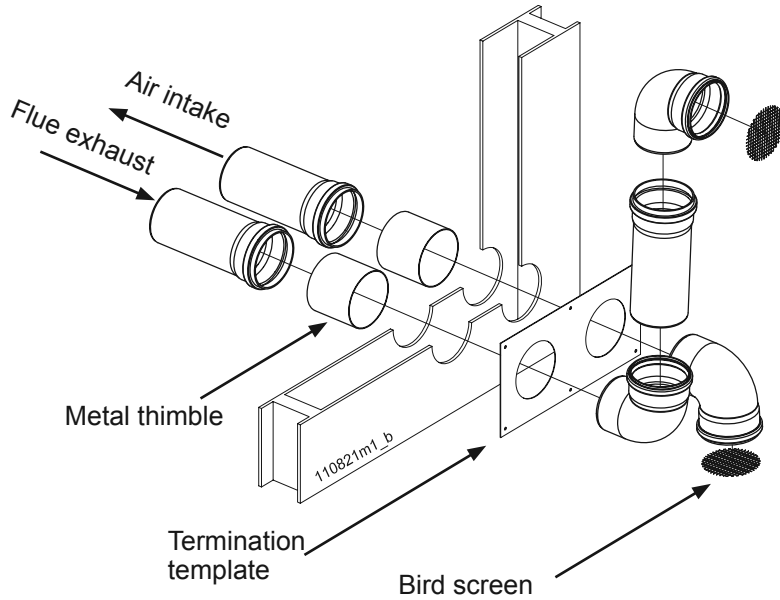
**Figure 12-16 Two pipes sidewall termination of air and vent (if space permits)**

3. The air piping must terminate in a down-turned elbow as shown in Figures 12-15 and 12-16. This arrangement avoids recirculation of flue products into the combustion air stream.
4. The vent piping must terminate in an elbow pointed outward or away from the air inlet, as shown in Figures 12-15 and 12-16.

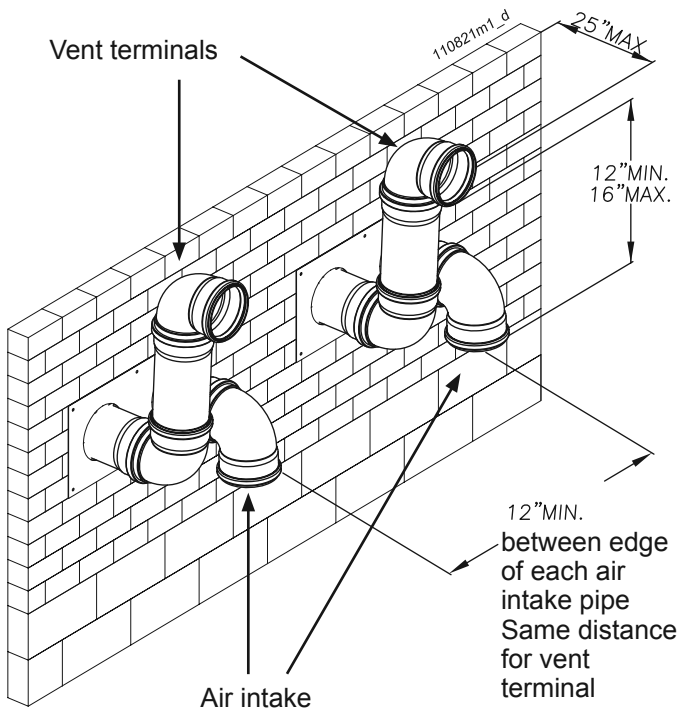
**! WARNING!!!** Do not exceed the maximum lengths of the outside vent piping shown in Figures 12-15 and 12-16. Excessive length exposed to the outside could cause freezing of condensate in the vent pipe, resulting in potential heater shutdown.

5. Maintain clearances as shown in Figures 12-15 and 12-16. Also maintain the following:
  - a. Vent must terminate:
    - At least 6 feet from adjacent walls.
    - No closer than 12 inches below roof overhang.
    - At least 7 feet above any public walkway.
    - At least 3 feet above any forced air intake within 10 feet.
    - No closer than 12 inches below or horizontally from any door or window or any other gravity air inlet.
  - b. Air inlet must terminate at least 12 inches above grade or snow line; at least 12 inches below the vent termination;
  - c. Do not terminate closer than 6 feet horizontally from any electric meter, gas meter, regulator, relief valve, or other equipment. Never terminate above or below any of these within 6 feet horizontally.
6. Locate terminations so they are not likely to be damaged by foreign objects, such as stones or balls, or subject to buildup of leaves or sediment.

# 12 - INSTALLATION - CATEGORY IV: Vent and combustion air



**Figure 12-17 Two pipes sidewall termination assembly**



**NOTICE!** Keep the air intake at min. 12" from grade or snow line. Provide vent and air intake with bird screen

**Figure 12-18 Two pipes multiple heaters vent terminations**

## 12.10.3 - Prepare wall penetrations

1. Air pipe penetration:
  - a. Cut a hole for the air pipe. Size the air pipe hole as close as desired to the air pipe outside diameter.
2. Vent pipe penetration:
  - a. Cut a hole for the vent pipe. For either combustible or noncombustible construction, size the vent pipe hole with at least a 1/2 inch clearance around the vent pipe outer diameter;
  - b. Insert a galvanized metal thimble in the vent pipe hole as shown in Figure 12-17.
3. Use a sidewall termination plate as a template for correct location of hole centers.
4. Follow all local codes for isolation of vent pipe when passing through floors or walls.
5. Seal exterior openings thoroughly with exterior caulk.

## 12.10.4 - Termination and fittings

1. The air termination coupling must be oriented at least 12 inches above grade or snow line as shown in Figures 12-15 and 12-16.
2. Maintain the required dimensions of the finished termination piping as shown in Figures 12-15 and 12-16.
3. Do not extend exposed vent pipe outside of the building more than what is shown in Figures 12-15 and 12-16. Condensate could freeze and block vent pipe.

## 12.10.5 - Multiple vent/air terminations

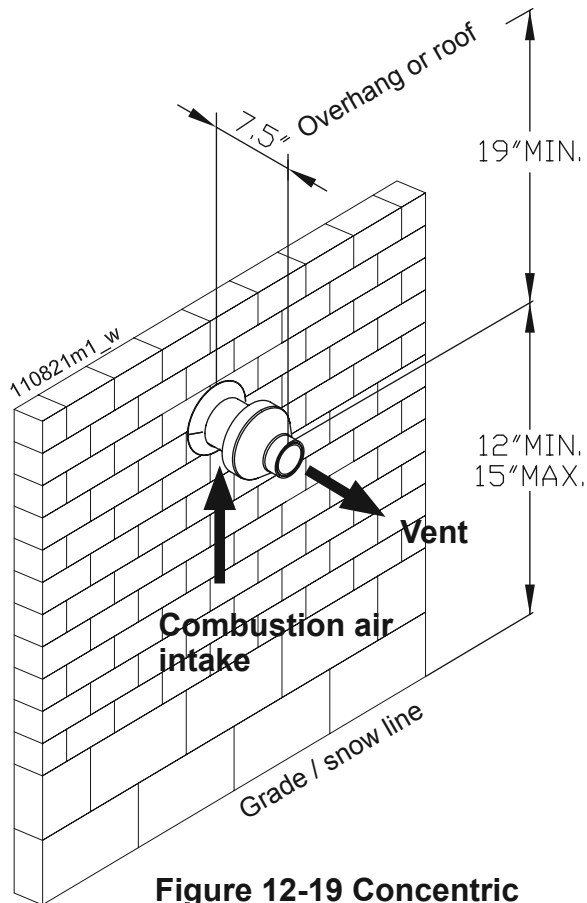
1. When terminating multiple heaters terminate each vent/air connection as shown in Figure 12-18.

**! WARNING!!!** All vent pipes and air inlets must terminate at the same height to avoid possibility of air inlet flue contamination that could result in excessive levels of carbon monoxide which can cause severe personal injury or death!

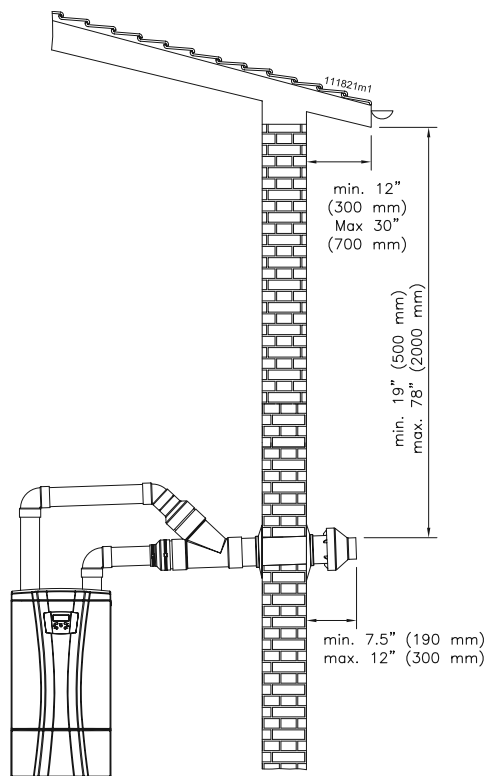
2. Place wall penetrations to obtain minimum clearance of 12 inches between edge of air inlet and adjacent vent outlet, as shown in Figure 12-18 for U.S. installations. For Canadian installations, provide clearances required by CSA B149.1 Installation Code.
3. The air inlet is part of a direct vent connection. It is not classified as a forced air intake with regard to spacing from adjacent heater vents.



## 12 - INSTALLATION - CATEGORY IV: Vent and combustion air



**Figure 12-19 Concentric sidewall termination clearances**



**Figure 12-20 Concentric sidewall termination clearances**

### 12.11 - Sidewall termination – Concentric vent

#### 12.11.1 - Description and usage

The termination kit must terminate outside the structure and must be installed as shown in Figure 12-19.

The required concentric termination kit as well as combustion air and vent pipe materials are listed in Figures 12-7 and 12-8.

The termination ending must be protected from rain, see Figure 12-20.

#### 12.11.2 - Sidewall termination installation

- Determine the best location for the termination kit (see Figures 12-19 and 12-20).
- The total length of piping for vent or air must not exceed the limits given in Section 12.3.
- You must consider the surroundings when terminating the vent and air:
  - Position the vent termination where vapors will not damage nearby shrubs, plants or air conditioning equipment or be objectionable.
  - The flue products will form a noticeable plume as they condense in cold air. Avoid areas where the plume could obstruct window views.
  - Prevailing winds could cause freezing of condensate and water/ice buildup where flue products impinge on building surfaces or plants.
  - Avoid possibility of accidental contact of flue products with people or animals
  - Do not terminate above any door or window. Condensate can freeze, causing ice formations.
  - Locate or guard vent to prevent condensate damage to exterior finishes.
- Cut one (1) hole 5 inch diameter into the structure to install the termination kit.
- Install the Concentric vent kit following the concentric kit manufacturer's instruction.

**NOTICE!** Ensure termination location clearance dimensions are as shown in Figures 12-19 and 12-20.

**CAUTION!!!** DO NOT use field-supplied couplings to extend pipes. Airflow restriction will occur and may cause intermittent operation.

- Operate the appliance one (1) heat cycle to ensure combustion air and vent pipes are properly connected to the concentric vent termination connections.

## 12 - INSTALLATION - CATEGORY IV: Vent and combustion air

### 12.11.3 - Multiventing sidewall terminations

When two or more direct vent appliances are vented near each other, each appliance must be individually vented and vent terminations may be installed as shown in Figure 12-21. It is important that vent terminations be made as shown to avoid recirculation of flue gas.

**! WARNING!!!** Do not connect any other appliance to the vent pipe or multiple heaters to a common vent pipe. Failure to comply could result in severe personal injury, death, or substantial property damage.

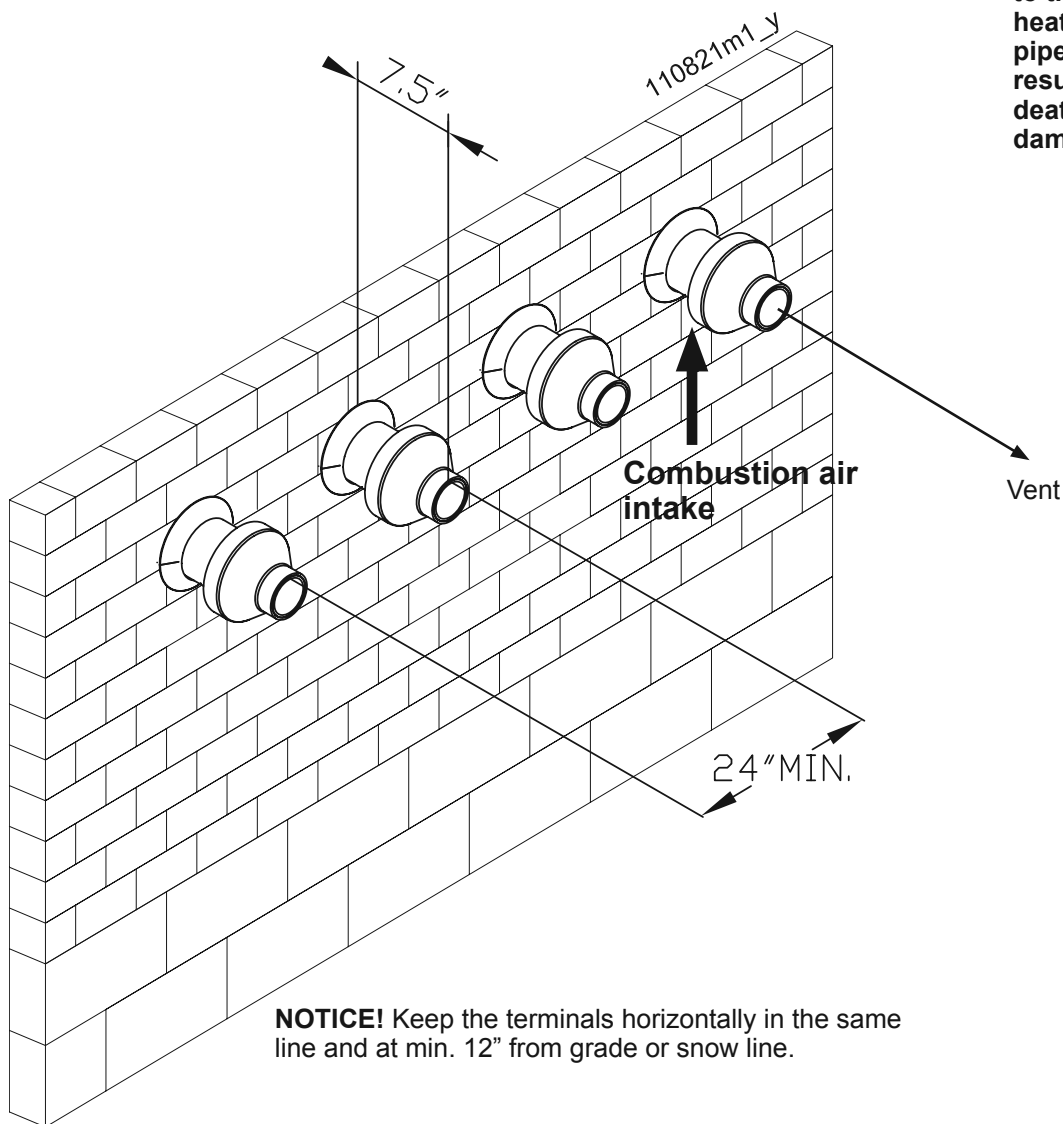


Figure 12-21 Concentric sidewall multiple heaters terminations

# 12 - INSTALLATION - CATEGORY IV: Vent and combustion air

## 12.12 - Vertical termination - Two pipes

**! WARNING!!!** Follow instructions below when determining vent location to avoid possibility of severe personal injury, death or substantial property damage.

**! WARNING!!!** Do not connect any other appliance to the vent pipe or multiple heaters to a common vent pipe. Failure to comply could result in severe personal injury, death, or substantial property damage.

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.

### 12.12.1 - Determine location

Locate the vent/air terminations using the following guidelines:

1. The total length of piping for vent or air must not exceed the limits given in the Section 12.3.
2. The vent must terminate at least 3 feet above the highest place in which the vent penetrates the roof and at least 2 feet above any part of a building within 10 horizontal feet.
3. The air piping must terminate in a down-turned 180° return pipe no further than 2 feet from the center of the vent pipe. This placement avoids recirculation of flue products into the combustion air stream.
4. The vent piping must terminate at least 1 foot above the air intake. The air inlet pipe and vent pipe can be located in any desired position on the roof, but must always be no further than 2 feet apart and with the vent termination at least 1 foot above the air intake.
5. Locate terminations so they are not likely to be damaged by foreign objects, such as stones or balls, or subject to buildup of leaves or sediment.

### 12.12.2 - Prepare roof penetrations

1. Air pipe penetration: cut a hole for the air pipe. Size the air pipe hole as close as desired to the air pipe outside diameter.
2. Vent pipe penetration:
  - a. Cut a hole for the vent pipe. For either combustible or noncombustible construction, size the vent pipe hole with at least a 1/2 inch clearance around the vent pipe outer diameter;
  - b. Insert a galvanized metal thimble in the vent pipe hole.
3. Space the air and vent holes to provide the minimum spacing shown in Figure 12-22 and listed in Section 12.12.1.
4. Follow all local codes for isolation of vent pipe when passing through floors, ceilings, and roofs.
5. Provide flashing and sealing boots sized for the vent pipe and air pipe.

### 12.12.3 - Termination and fittings

1. Prepare the vent termination and the air termination elbow (Figure 12-22) by inserting bird screens.
2. The air piping must terminate in a down-turned 180° return bend as shown in Figure 12-22. Locate the air inlet pipe no further than 2 feet from the center of the vent pipe. This placement avoids recirculation of flue products into the combustion air stream.
3. Maintain the required dimensions of the finished termination piping as shown in Figure 12-22.
4. Do not extend exposed vent pipe outside of building more than shown in Figure 12-22. Condensate could freeze and block vent pipe.

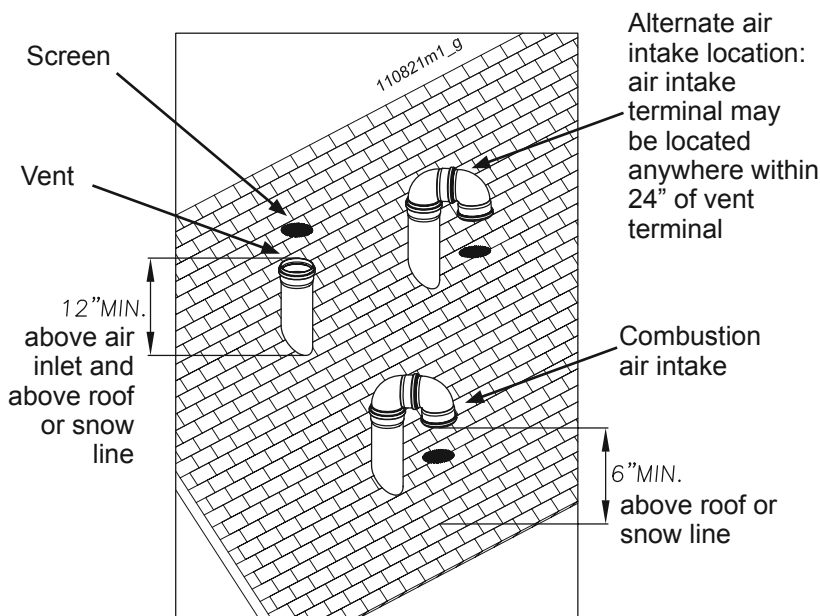


Figure 12-22 Two pipes vertical terminations of air and vent

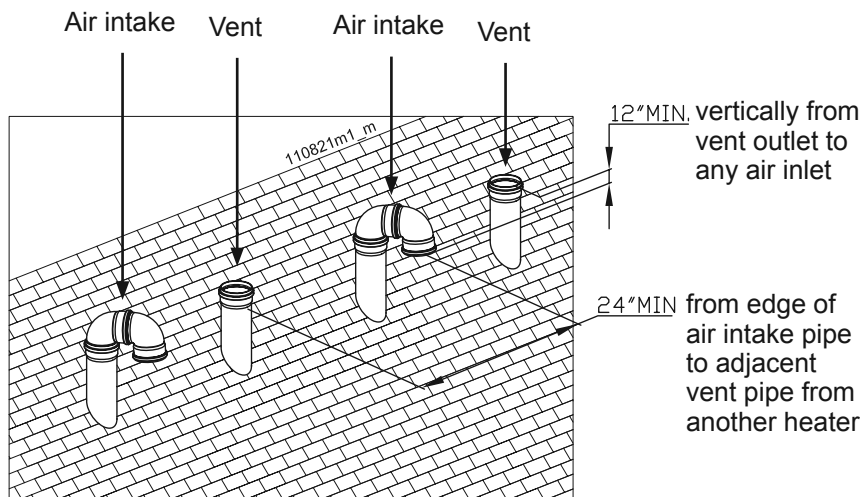
# 12 - INSTALLATION - CATEGORY IV: Vent and combustion air

## 12.12.4 - Multiple vent/air terminations

1. When terminating multiple heaters, terminate each vent/air connection as shown in Figures 12-23 and 12-24.

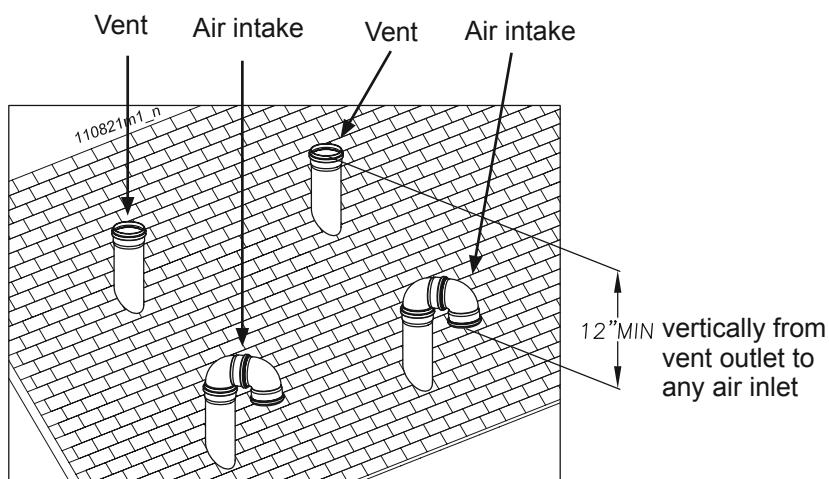
**WARNING!!!** Terminate all vent pipes at the same height and all air pipes at the same height to avoid possibility of severe personal injury, death, or substantial property damage.

2. Place roof penetrations to obtain minimum clearance of 12 inches between edge of air intake elbow and adjacent vent pipe of another heater for U.S. installations (see Figure 12-23). For Canadian installations, provide clearances required by CSA B149.1 Installation Code.
3. The air inlet is part of a direct vent connection. It is not classified as a forced air intake with regard to spacing from adjacent heater vents.



**NOTICE!** Keep the terminals at min. 12" from grade or snow line. Provide vent and air intake with bird screen.

**Figure 12-23 Two pipes Multiple heaters vertical terminations**



**NOTICE!** Keep the terminals at min. 12" from grade or snow line. Provide vent and air intake with bird screen.

**Figure 12-24 Alternate vertical terminations with multiple heaters**

# 12 - INSTALLATION - CATEGORY IV: Vent and combustion air

## 12.13 - Vertical termination – Concentric vent

### 12.13.1 - Description and usage

Both combustion air and vent pipes must attach to the termination kit. The termination kit must terminate outside the structure and must be installed as shown in Figure 12-25.

### 12.13.2 - Determine location

Locate the vent/air terminations using the following guidelines:

1. The total length of piping for vent or air must not exceed the limits given in Section 12.3.
2. The concentric terminal must terminate at least 3 feet above the highest place in which the vent penetrates the roof and at least 2 feet above any part of a building within 10 horizontal feet.
3. Locate termination so it is not likely to be damaged by foreign objects, such as stones or balls, or subject to buildup of leaves or sediment.

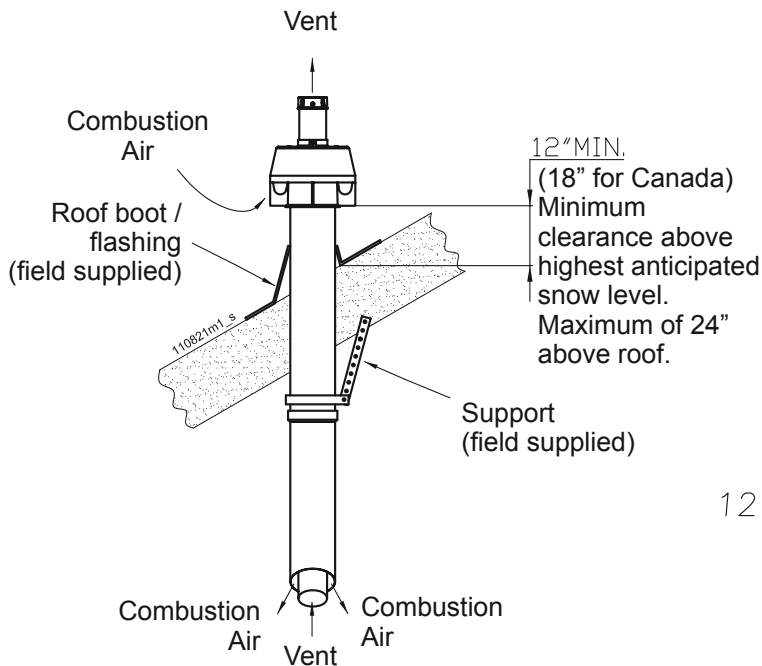


Figure 12-25 Concentric vertical terminations

### 12.13.3 - Vertical termination installation

1. Determine the best location for the termination kit (see Figure 12-26).
2. The total length of piping for vent or air must not exceed the limits given in Section 12.3.
3. You must consider the surroundings when terminating the vent and air:
  - a. Position the vent termination where vapors will not damage nearby shrubs, plants or air conditioning equipment or be objectionable.
  - b. The flue products will form a noticeable plume as they condense in cold air. Avoid areas where the plume could obstruct window views.
  - c. Prevailing winds could cause freezing of condensate and water/ice buildup where flue products impinge on building surfaces or plants.
  - d. Avoid possibility of accidental contact of flue products with people or animals
  - e. Do not terminate above any door or window. Condensate can freeze, causing ice formations.
  - f. Locate or guard vent to prevent condensate damage to exterior finishes.

4. Cut one (1) hole into the structure to install the termination kit.
5. Install the Concentric vent kit following the concentric kit manufacturer's instruction.

**NOTICE!** Ensure termination location clearance dimensions are as shown in Figures 12-25 and 12-26.

**NOTICE!** Ensure termination height is above the roof surface or anticipated snow level (12 inches in U.S.A. or 18 inches in Canada) as shown in Figure 12-25.

**CAUTION!!!** DO NOT use field-supplied couplings to extend pipes. Airflow restriction will occur and may cause intermittent operation.

6. Operate the appliance one (1) heat cycle to ensure combustion air and vent pipes are properly connected to the concentric vent termination connections.

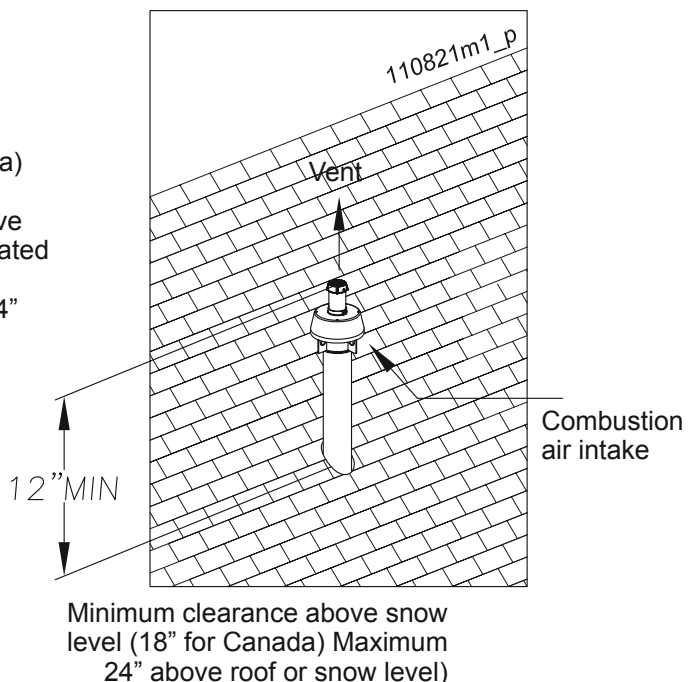


Figure 12-26 Concentric vertical terminations

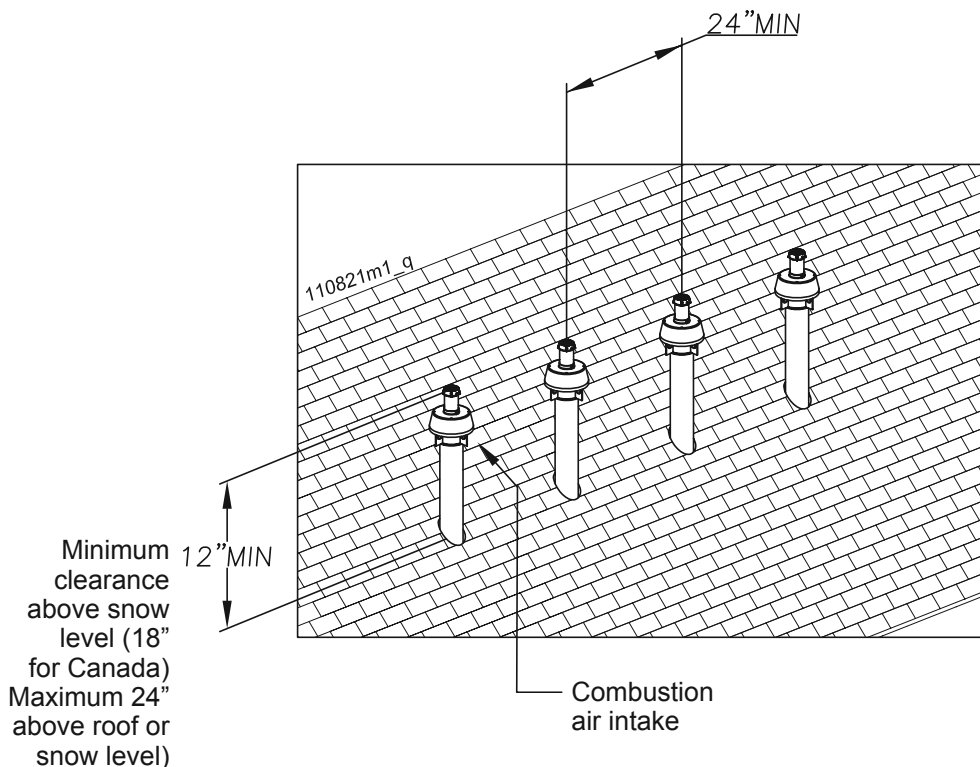
# 12 - INSTALLATION - CATEGORY IV: Vent and combustion air

## 12.13.4 - Multiventing vertical terminations

When two (2) or more direct vent appliances are vented near each other, each appliance must be individually vented (see Figure 12-27).

**! WARNING!!! NEVER common vent or breach vent this appliance to avoid possibility of severe personal injury, death, or substantial property damage.**

When two or more direct vent appliances are vented near each other, two vent terminations may be installed as shown in Figure 12-27. It is important that vent terminations be made as shown to avoid recirculation of flue gases.



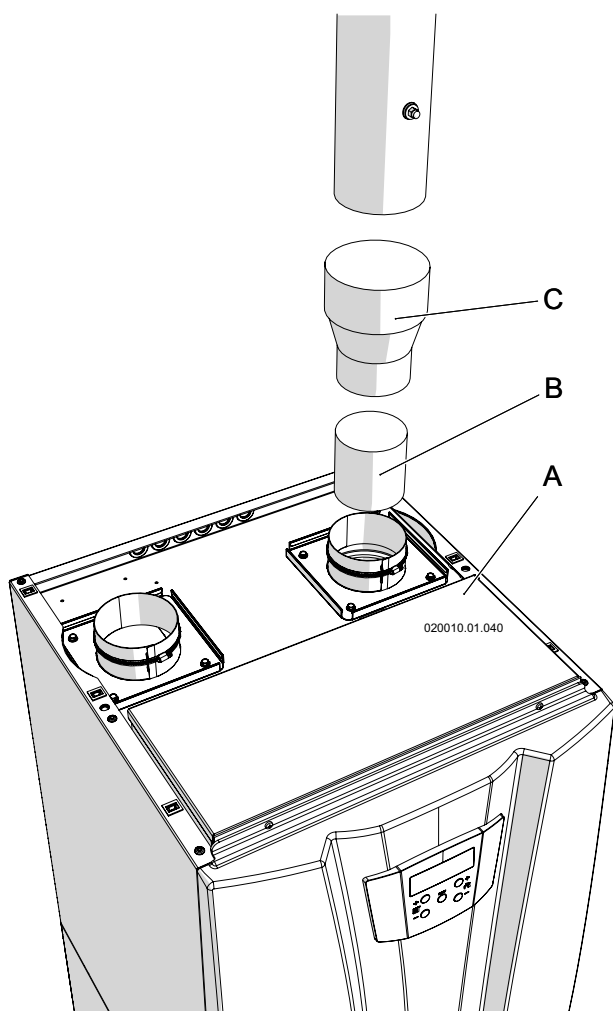
**Figure 12-27 Concentric multiple heaters vertical terminations**

# 13 - INSTALLATION - CATEGORY II: Vent and combustion air

## 13.1 - CAT II: Negative pressure condensing

An appliance that operates with a non-positive vent static pressure with a vent gas temperature that may cause excessive condensate production in the vent.

## 13.2 - CAT II: Adapter and increaser

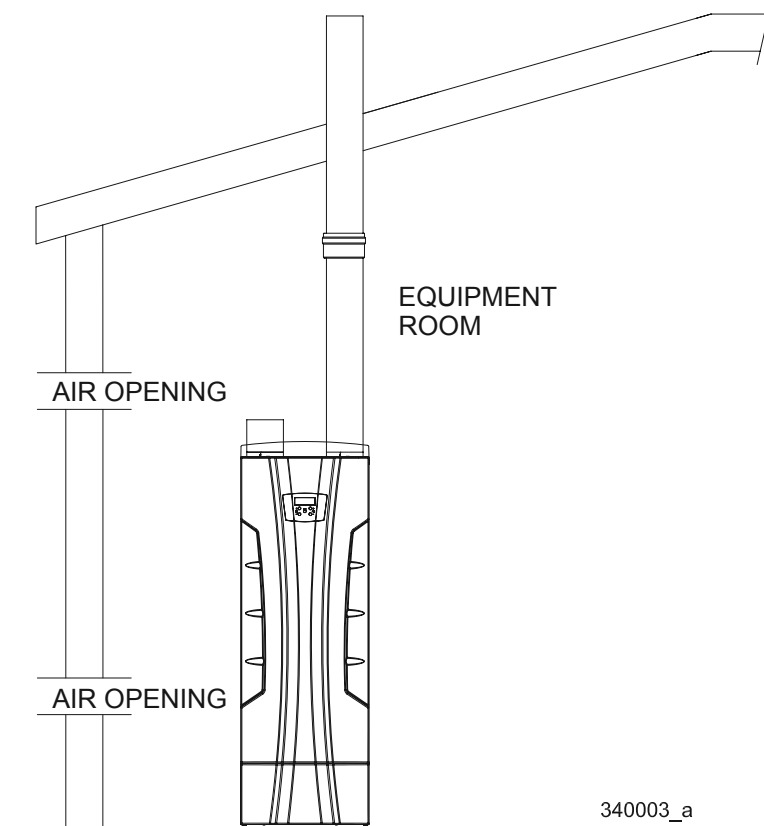


A = HEATER  
B = ADAPTER  
C = INCREASER

Figure 13-1 Adapter and increaser

MODEL	FLUE SIZE	FAMILY OF MATERIAL	MANUFACTURER	ADAPTER	INCREASER	AIR INLET	VENT ROOF TERMINAL
199	3" to 6"	Stainless steel	DURAVENT	810005378	810003136 + 810005375	FSBS6 + FSELB9006	FSVL 3606
399 500	4" to 8"	Stainless steel	DURAVENT	810005545	810005375 + 810005385	FSBS8 + FSELB9008	FSVL 3608
750 1000	6" to 8"	Stainless steel	DURAVENT	810005231	810005385	FSBS8 + FSELB9008	FSVL 3608

# 13 - INSTALLATION - CATEGORY II: Vent and combustion air



**Figure 13-2 Vertical vent with combustion air from equipment room**

## 13.3 - Condensing vent option: CATEGORY II: Vertical vent with combustion air from equipment room

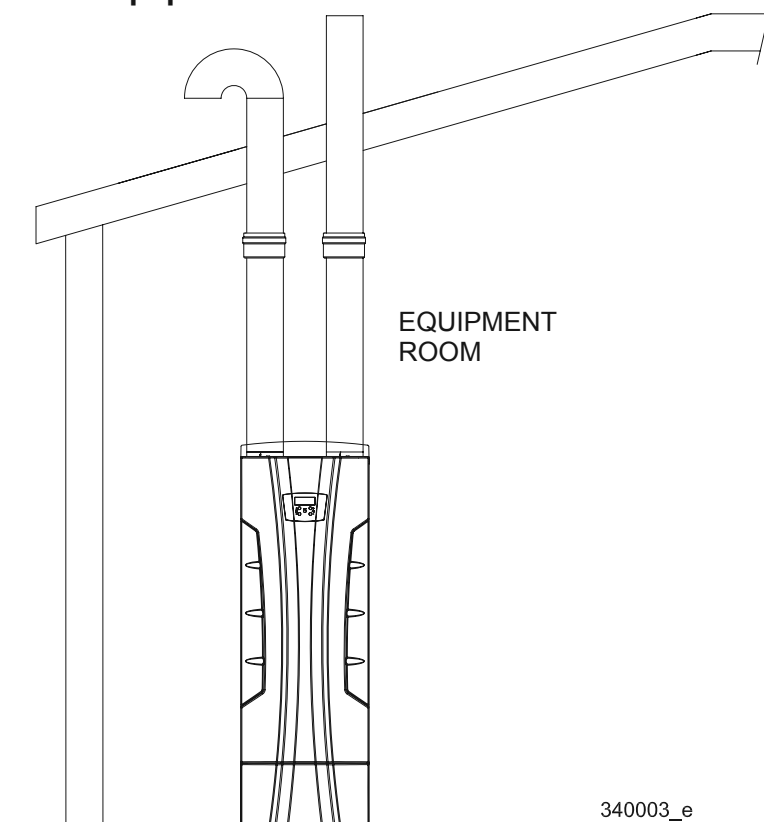
The flue outlet terminates on the rooftop.

The termination point for the flue products must follow the vertical vent termination clearance requirements on section 12.12. These units can be identified by the CATEGORY II as noted on the unit's rating plate.

The flue from this category II appliance must have all vent joints and seams sealed gastight. A category II vent system has specific vent material and installation requirements.

The flue products in the vent system may be cooled below their dew point and form condensate in the flue. The materials used for a category II vent must be resistant to any corrosive damage from flue gas condensate.

Follow all requirements in section 5.1, 12.2 and 12.9. Follow all requirements for venting flue products to the outdoors with a vertical termination as per section 12.12.



**Figure 13-3 Vertical direct vent installation with rooftop combustion air inlet**

## Vertical direct vent installation with rooftop combustion air inlet

The vertical direct vent system is installed with a Category II flue and a separate combustion air pipe to the outdoors. The flue outlet and combustion air intake must both terminate on the rooftop.

The termination point for the flue products must follow the vertical vent termination clearance requirements on section 12.12. These units can be identified by the Category II as noted on the unit's rating plate.

Follow all requirements in sections 5.1, 12.2 and 12.9. Follow all requirements for venting flue products to the outdoors with a vertical termination as per section 12.12.

The vertical direct vent system requires the installation of an additional pipe to supply combustion air from outdoors directly to the appliance. Follow all requirements under the combustion air inlet section 12.5.



# 13 - INSTALLATION - CATEGORY II: Vent and combustion air

## Vent/Air vertical installation with sidewall combustion air inlet

The vent/air vertical with a sidewall combustion air vent system terminates the flue at the rooftop and air inlet at the sidewall. The flue outlet and combustion air intake terminate in different pressure zones.

The termination point for the flue products must follow the vertical vent termination clearance requirements on section 12.12. These units can be identified by the Category II as noted on the unit's rating plate.

Follow all requirements in sections 5.1, 12.2 and 12.9. Follow all requirements for venting flue products to the outdoors with a vertical termination as per section 12.12.

The vent/air vertical system requires the installation of an additional pipe to supply combustion air from outdoors directly to the appliance. Follow all requirements under the combustion air inlet section 12.5.

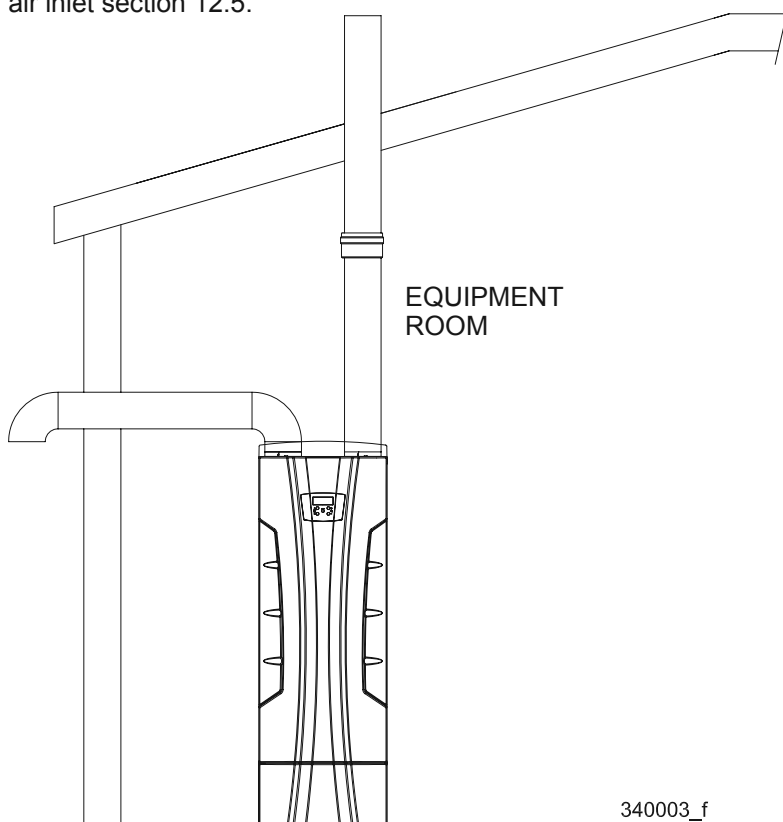


Figure 13-4 Vertical vent/air installation with sidewall combustion air inlet

## Common venting CATEGORY II:

Flues of multiple water heaters may be combined by incorporating a vent increaser to change the category IV appliance to a category II vent system which can be common vented using an engineered vent system. The increaser kit must be provided by the manufacturer and the combined engineered vent system must be designed to ensure that flue products will be properly exhausted from the building at all times.

**! WARNING!!!** Failure to use the correct vent increaser or a properly sized vent system may result in excessive levels of carbon monoxide which can cause severe personal injury or death!

Consult a vent designer to determine the diameter of the common vent pipe required for combined vent installation. It is recommended that all vent joints and seams are sealed gashigt. This vent system has specific vent material and installation requirements. The negative draft in a conventional vent installation must be within the range of 0.02 to 0.08 inches w.c. to ensure proper operation. Make all draft readings while the unit is in stable operation (approximately 10 minutes).

**! WARNING!!!** Improper venting can result in excessive levels of carbon monoxide which can cause severe personal injury or death!

1. INSTALL A CARBON MONOXIDE DETECTOR. At the time of installation of the common vented gas fueled equipment, the installing plumber or gasfitter shall observe that a hard wired carbon monoxide detector with an alarm and battery back-up is installed on the floor level where the gas equipment is to be installed. It shall be the responsibility of the property owner to secure the services of qualified licensed professionals for the installation of hard wired carbon monoxide detectors.
2. APPROVED CARBON MONOXIDE DETECTORS. Each carbon monoxide detector as required in accordance with the above provisions shall comply with NFPA 720 and be ANSI/UL 2034 listed and IAS certified.