



Venting FAQs

Every piece of equipment has different venting guidelines. Please refer to your manufacturer's and your local jurisdiction's venting requirements for more detail.

Which flue material can I use for my unit?

All flue material that is listed to UL 1738 certified for the relevant equipment category is acceptable.

What are UL 1738 equipment categories?

UL 1738 breaks up the venting systems for gas-burning appliances into four categories: Category I, Category II, Category III, and Category IV. These categories are differentiated by their expected vent pressure and expected flue gas temperatures. Flue gas temperature is indicative of whether or not condensation will form in the vent. The following table lists the characteristics of each equipment category.

	Positive Vent Pressure	Condensation in Vent
Category I		
Category II		x
Category III	x	
Category IV	x	x

Must I use Category I vent material for the run of vent in a warm mechanical room?

Look at the main information decal attached near the front of the unit to determine whether the appliance is for installation utilizing Category I venting only, Category III venting only or if the appliance is for installation utilizing Category I, III or IV venting. PVI recommends using negative pressure, non-condensing vent materials, like type B venting in all Category I vent systems. When properly installed with UL, ULC, ETL or CSA listed Category I venting, the appliance operates with a non-positive vent

static pressure and with a vent gas temperature that avoids excessive condensate production in the vent.

Where can I get Category II vent material? Is it the same as Category IV?

The manufacturers of vent material only produce Category I and Category IV vent material. A vent requiring a Category II vent system must use a Category IV vent material.

Why does my municipality prohibit the use of PVC flue materials?

At operating temperatures greater than 140°F, PVC will begin to melt, which may cause warping and sagging of the flue. Any damage to the integrity of the flue risks improper expulsion, back pressure issues, and leaking of the flue into the mechanical space. It is important to be aware of your unit's exhaust temperatures, which are typically dependent on the unit's setpoint. PVC is also highly toxic when burned.

What if my building's walls are combustible?

Wall and roof penetrations must follow all applicable codes and the vent manufacturer's instructions. Vents must never be installed at less than required clearances to combustible materials, as enumerated in UL, NFPA, CSA B149.1-10 or local codes, "Double-wall" or "Thimble" assemblies are required when vents penetrate combustible walls or roofs.

What if my flue is larger than the exhaust connection on my unit?

An adapter can be used directly at the exhaust manifold to connect the flue to the unit. These are typically sourced from the flue manufacturer. Depending on the adapter, it can be connected to the exhaust manifold by a hose clamp or a Viton caulk or other high temp RTV sealant.

What if my system is in a noise sensitive area like a school or hospital?

Mufflers are available to mitigate the noise out of the flue. Note that upsizing the vent may also result in less noise through the flue.

Why does my boiler or water heater sound like it's howling?

Howling sounds or tones may indicate that your boiler or water heater is being starved of combustion air (CA). This may be due to poor CA calibration, blocked flue or CA inlet, clogged air filter, or a poor layout.

What if I don't have enough room air for all my equipment?

CA can either be ducted directly to the unit or taken from the mechanical space. Louvers may be used to supply air to the mechanical room. Louvers must be sized per NFPA 54 requirements to provide adequate air volume to all equipment in the mechanical space at full fire.

What if I can only have one penetration through the wall?

When only one penetration is available through the wall or roof, the flue may be manifolded, and the CA may be taken from the mechanical room. A concentric flue vent may also be used, provided the flue manufacturer is able to fabricate one large enough for your system. Note that only Category I vents can be combined without an engineered vent system. An engineered vent system requires a special vent system with an induced draft fan to mechanically control the movement of flue products and prevent backflow into the mechanical space.

How do I know if my vent is sized properly?

The flue duct should be sized to be within the maximum equivalent length and pressure drop limits listed by the unit manufacturer. All manufacturer guidelines should be adhered to.

What if I have existing venting?

Existing venting may be used for new equipment, provided its layout and materials adhere to the manufacturer's and local jurisdiction's venting requirements.

If I retrofit a Category I appliance and the unit's vent is smaller than that of the existing unit, why can't I tie into the existing vent? Isn't bigger better?

Always consult the vent tables in the National Fuel Gas Code (NFGC) to ensure proper operation. This is especially true for fan assisted combustion units (FAN). The FAN column in the NFGC vent tables lists a minimum and maximum Btu/h rating for each flue diameter. Also, the new fan assisted product may modulate the input below the minimum required for a larger existing stack. In this case the flue products would not have enough heat to ensure a proper draft, which can result in flue gas condensate and flue gas spillage. Both are potentially dangerous, so a careful review of the vent capacity must always be considered to ensure safe operation.

What if I have an existing chimney?

An existing chimney may be used for venting; however, it may have to be lined with proper flue material according to manufacturer's and local jurisdiction's codes.

Is there a chance of condensate settling in my ductwork?

Per NFPA 54, the flue must be pitched up toward termination a minimum of 1/4" per foot of run. This pitch prevents condensate from settling in the joints of the vent and corroding the flue material. Drain tees should be installed every 20' of horizontal run and at the base of every common vertical run. When utilizing a side-wall termination, it is advised to have a diameter increase or a steeper pitch near the wall penetration to prevent condensate transport and spraying at the termination during high fire operation.

What if I cannot keep my CA vent sloped upward?

Low spots in the CA are allowed provided the CA duct is sized accordingly to overcome the resistance of the low spots. It is also important to use a bird screen at termination to prevent animals from entering the duct. When using a bird screen termination, it is recommended to use a termination tee to allow for proper free area.

Is there a risk of my CA being contaminated by other sources?

There is always a risk of CA contamination. Contamination can occur from many things, including flue recirculation, refrigerant, nitrate, sulfate, or water softener exposure, among others. The CA intake should be placed away from these contaminants. Per NFPA 54, the flue must terminate a minimum of 3' above or 10' horizontally removed from any building air intake to avoid flue recirculation. Compliance with the NFPA minimum does not eliminate flue gas recirculation in all cases. Always strive to maximize separation and reduce potential contamination in your installation design. Wind blocked areas, parking garages, loading docks, and areas where salt or refrigerant is used should be avoided when placing the CA intake. Prevailing winds should also be considered.

Why am I experiencing pitting in my condensate drainage?

Corrosion in the aluminum or stainless-steel condensate drainage is likely caused by CA contamination. This may lead to a heat exchanger failure if not quickly diagnosed. It is important to check for likely causes of CA contamination and perform a heat exchanger inspection.

How do I fit my flue termination?

For condensing equipment, it is recommended to fit your termination with a velocity cone to promote proper expulsion of the flue. Velocity, or exit, cones help to expel the flue gas more quickly, diluting it with air and dispersing it before it can condense on nearby mechanical equipment or structures and cause damage or corrosion.

What if I have a high wind application?

At high wind sites, it is recommended to use a termination tee on the air inlet and flue outlet to avoid wind interference and prevent flame loss.

What if I cannot terminate vertically through the roof?

Horizontal termination through a side wall is acceptable provided the flue terminates in an open area. Discharges in corners or located directly behind vegetation may cause the flue pressures to fluctuate and result in flame instability. Vents must

not terminate over public walkways or areas where condensate or vapor could create a nuisance or be detrimental to the operation of regulators, meters, or related equipment. Side wall termination must be a minimum of 6" from the exterior wall.

What units does PVI make that can be sidewall vented without using a separate mechanical sidewall vent system?

All PVI units listed for use with Category IV positive pressure vent systems may be sidewall vented without the use of a mechanical draft device up to a certain vent length. The Maximum Category IV Vent Length and vent diameter is listed in the Installation & Maintenance manual of each product.

What if my vent is too long?

The pressure drop needs to be considered for proper burner operation and boiler heating capacity. The maximum allowable pressure drop in the vent system will be specific to the unit manufacturer. Draft controls may be necessary per manufacturer approval.

What are the limits in vertical rise and horizontal run of a conventional "negative draft" Category I vent system?

Proper vent system design is critical to the efficient operation of a gas appliance. The limits in vertical and horizontal run can best be evaluated by using the venting tables in the National Fuel Gas Code. The tables rate each vent diameter for a capacity in Btu's based on both the vertical and horizontal run of the vent. There are separate columns for atmospheric combustion units (NAT) and FAN. As a general rule, the tables in the National Fuel Gas Code are based on a maximum horizontal run of flue not to be more than 1 ½ feet for each inch of vent diameter. Operation of a flue with this maximum horizontal run must include a vertical height noted in the venting tables to generate adequate draft in the vent system. Any time the 1 ½ feet per inch of diameter length in horizontal run is exceeded, there is a very good chance that you will experience problems with the venting system.

Am I able to use draft controls in my venting?

When expected draft measurements are within the boiler manufacturer's allowable values, it is not recommended to use draft controls. For extremely long stacks or stacks with little vertical height, draft inducers may be recommended.

How do I size my draft controls?

The draft control provider is responsible for all calculations to maintain pressures within the tolerances listed by the boiler manufacturer.

Where should my draft controls be placed?

For common vented layouts, it is best to place draft controls in the common vent rather than the individual vent. All layouts should be evaluated on a case-by-case basis to determine best placement for draft controls.

What is a draft damper?

Dampers are used to control overdraft within the flue. They do this by oscillating to maintain proper pressure drop. Modulating the position of the damper maintains a constant draft.

What kind of damper can I use?

Draft dampers for Category III and IV vent systems must be sealed to prevent flue gases from being expelled into the mechanical room. Barometric dampers should not be used for Category III and IV vent systems as they are typically unsealed. For modulating equipment, faster actuators are necessary and limited damper positions are used to prevent negative impacts on combustion processes. Typically, the damper positioning range is set between 80-90% open and 30-50% closed.

Is a barometric damper required on all Category I common vent units?

Draft conditions in vent systems vary due to the negative forces caused by changes in temperature and barometric pressure, as well as the effects of wind. For proper operation and efficient consumption in fuel fired heating appliances, draft must remain constant. PVI recommends the installation of barometric dampers in the flue of each unit when they are commonly vented for Category I vent systems and ships a draft control with each product for convenience. The draft control is not required for proper operation. A minimum of $-.02''$ to $-.06''$ W.C. draft is required for appliances vented by natural draft.

How do I set a barometric damper?

The burner must be running when the adjustment of the control is made. A draft gauge is required to read the draft below the damper and above the unit's flue outlet. Adjust the weights on the damper to provide a negative draft of $0.02''$ to $0.08''$ W.C. when the unit is firing at full rate on a typical cool day.

How do I measure draft in my PVI product?

A draft gauge must be used. A small $\frac{1}{4}''$ hole should be placed in the stack approximately 3 to 4 feet above the unit's flue outlet and below any installed dampers. Insert the tube from the draft gauge just into the flue and measure the draft on the scale as the unit is firing.

What is a draft fan or an exhaust fan?

Similar to a booster pump, a draft fan is used to induce a draft within the flue by pulling the exhaust gases out of the flue. By doing so, the draft fan creates the proper amount of draft/back pressure in the boiler combustion chamber promoting proper combustion.

