

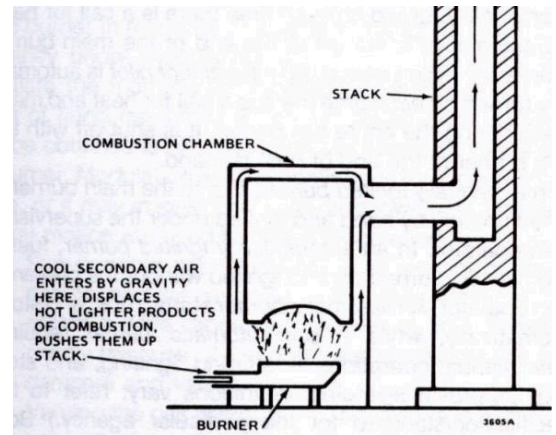
# Venting and Combustion Air: The Two Biggest Installation Sins and What You Can Do Better

## Safety Note

The two biggest sins found time and time again within industrial facilities are related to combustion air and flue venting for fuel-fired equipment and their gas trains. Overlooking or committing these common mistakes can lead to increased risk of combustion related incidents, reduced equipment life, impaired production and an overall reduced level of safety for personnel working with and around the equipment. Addressing the most important issues related to these installation errors must be considered in order to make your facility and entire organization a safe place to work.

Many commercial hot water heaters and boilers are natural or atmospherically drafted, meaning that there are no fans installed. Instead, they rely on density differences from hot air to cold air to cause the flue products to move up and out the stack. These appliances can be sensitive to conditions within the building for them to operate correctly, though. Whether replacing a unit or installing a new one, this is an area you'll want to pay close attention to. Most of the rules for installing these kinds of appliances and how they should be vented are in a publication called the National Fuel Gas Code, published by the National Fire Protection Association, [www.nfpa.org](http://www.nfpa.org), also called NFPA 54. Within this document, are a range of sizes, arrangements, and configurations for arranging and installing vents for single or multiple appliances. This document is a great first step for a safe installation. If purchased, be certain to look for the items that have an asterisk, which indicates they have educational appendix. This part of the code is not enforceable, but does contain great and useful information.

Codes like NFPA 54 are minimum requirements for safety. There are many subtle things in the code that one might dismiss at first glance, but a few of these items could mean the difference between life and death in one of your facilities. When it comes to venting appliances, NFPA 54 tells you what to do: how much air is required for combustion, the size of louvers, etc. However, one of the most important points of the code, which is often overlooked, is the need to conduct performance testing once the installation is complete. This is identified in section 11.6. It states that you need to turn all of the appliances on for several minutes and verify that they are actually drafting correctly. Completing this step reveals issues: do not skip it.



Addressing the most important issues related to installation errors must be considered in order to make your facility and entire organization a safe place to work. If not done properly, it can lead to increased risk of combustion related incidents, reduced equipment life, impaired production and an overall reduced level of safety for personnel working with and around the equipment.

In many cases, provisions are made for code required combustion air, but they're blocked off or restricted by dirty air intakes, trash bags/debris, and/or storage of building related supplies. In these cases, it is not uncommon for back drafting to occur. This happens often when there are multiple appliances in the room and combustion air starts coming from appliances that are off down their flues. The problem is that when they need to fire, their flames roll out until a draft can be established.



Flame roll out makes for obviously dangerous conditions. It means that fires can start, fuel/air mixtures are wrong, components get damaged, and Carbon Monoxide can be liberated to air handlers and/or occupied spaces. Flame roll out often appears as singed and/or burned up paint at the bottom of a unit. If you see this, there is a problem. Shut the unit down until the combustion air or flue issues can be fixed.

Another common problem concerns barometric relief dampers. These are installed on venting systems in situations where stacks are very tall or older masonry chimneys are used. These are meant to break the drafts that are too strong or suction that can be created in these circumstances. Too much draft can make flames unstable; hence, when these work correctly, they are an effective fix.



These devices consist of what looks like a loosely hung damper blade with some type of weight or adjustment.

This adjustment is to set the draft point where the damper swings open and allows room air into the fuel. These are always supposed to be letting room air in and never flue gasses out into the room. Many times, these are found to be broken, stuck, or not set correctly. Make sure these are checked to verify flow direction and proper operation.

Below is a summary of the issues identified above, along with additional items to check related to venting and combustion air issues:

1. If motorized dampers exist for bringing in combustion air, they must be interlocked to the burner firing controls.
2. Flues must not discharge within 10' of operable windows or air intakes.
3. Verify that all combustion air intakes are clear of debris.
4. Verify that exhaust fans or other appliances that draw air out of the building are not communicated to the room where the natural draft appliances are located. Combustion air must be provided to satisfy the combustion needs and the exhaust needs.
5. Install Carbon Monoxide detectors in mechanical rooms with naturally drafted appliances.
6. Verify combustion air grille/louver sizing with NFPA 54.
7. Conduct a performance test of naturally drafted appliances to make sure they are venting properly. Make sure to simulate conditions in the building that could represent real life conditions.
8. Verify that flames appear to be blue with yellow or orange flickers and that no signs of sooting or flame roll out exist. Never try and observe a light off with your body in a vulnerable position.
9. Verify that barometric relief dampers are functioning properly.
10. Verify that vent piping sizes and arrangements are as per NFPA 54 standards.

## ABOUT US

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Honeywell Combustion Safety is a part of Honeywell Thermal Solutions, an industry leader in commercial and industrial combustion solutions. Honeywell Combustion Safety, formerly known as CEC Combustion Safety, has been in business since 1984. With engineers and staff members that sit on Code committees such as NFPA 56, NFPA 85, NFPA 86, and NFPA 87, our inside expertise is integrated within all of our practices, and our global reach ensures that customers around the world are kept safe. Honeywell offers testing and inspections, engineering & upgrades/retrofits, gas hazards management, training, and field services for all industrial facilities and different types of fuel fired equipment. By assisting organizations and their personnel with the safe maintenance and operation of their combustion equipment, Honeywell aims to save lives and prevent explosions while increasing efficiency and reliability of combustion equipment.

The bottom line is that natural draft appliances pose risks. This is why installing Carbon Monoxide detectors is always recommended in any facility mechanical room that has such an appliance. These are available at every local hardware store, so there is no reason why they should not be installed within any industrial facility, school, hospital, and/or nursing home.

Remember, codes are minimum safety standards and do not replace common sense. Do everything the code states, and then conduct a performance test simulating even the small, seemingly insignificant occurrences that can happen within the building. Ensure that provisions are made for these issues before considering the installation project complete. In many cases, combustion equipment only gives you one chance to be safe. Being wrong could mean an explosion, fire, or even death.

#### **For more information**

Learn more about Honeywell Combustion Safety, contact [info@combustionsafety.com](mailto:info@combustionsafety.com), visit [www.combustionsafety.com](http://www.combustionsafety.com) or contact your Honeywell Sales Engineer.

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