

# Is Your Oven Telling You It's Unsafe?

## Safety Note

If you know what to listen and look for, your fuel train, purge system, ignition system and explosion-relief panels will tell you when your oven may be operating unsafely.

Combustion equipment will provide you with signals that you must understand to prevent a potentially tragic incident. These signals may be subtle or blatant, but how discernable they are has much to do with the skills of the person who is looking and listening.

Consider, for example, the case of a paint oven operator in an automotive plant. The operator heard “poofs” and saw the paint oven’s explosion relief door swing open wildly every time he lit off. The operator considered this annoyance and took care of it by blocking the explosion relief door closed. Eventually, the oven, having an obvious ignition problem and no longer able to relieve itself as designed, exploded and destroyed itself. The explosion led to days of downtime and repair, and the experience cost the company more than \$500,000. The company was fortunate that no one was seriously injured.

The oven operator misread the poofs, pops and long light-off periods – all subtle danger signals. The relief door swinging open was not as subtle; however he did not understand that the relief door was an ally and must remain unobstructed. Every operator should be aware of and understand the oven-related warning signs to maintain personnel safety.

### Poofs and Pops are Never Good

Poofs and pops are signs of trouble if they occur when lighting off equipment. Although the National Fire Protection Association’s Standard for Ovens and Furnaces, NFPA 86, allows up to 15 seconds for pilot and main flame trial for ignition, one should be concerned if it takes close to that long to light off. In most cases, light-offs should occur within five seconds. If the time for ignition begins to move beyond five seconds, you may be receiving a message that something is wrong. Poofs or pops could be caused by anything from a defective (worn down, carboned up or improperly adjusted) igniter to an improper purge. If this situation occurs, it is time to stop and investigate your fuel train, purge system, fuel-air ratio control and ignitions system thoroughly.



Figure 1:  
This is a typical explosion-relief door with an identifying sign. Make sure that doors like this on your oven are not obstructed. Also, review the surrounding area for operator and personnel access. The area must be restricted to ensure no one is in the regular path of an explosion-relief door or panel.

## Explosion-Relief Panels Need to be Able to Perform

You must ensure that you have explosion relief – the ability to contain an explosion – built into your oven design. NFPA 86 (2015 Edition), section 5.3, calls out requirements for explosion-relief panels. The document mandates installation of explosion-relief panels at a ratio of 1 ft<sup>2</sup> for every 15 ft<sup>3</sup> of oven volume. Also, explosion relief is to be installed as close to ignition sources as possible. Exceptions occur if the oven construction is of 3/16" of heavier steel-plate shells reinforced with structural steel beams and buckstays that support and retain refractory or insulating materials that are required for temperature endurance, as they are unsuitable for the installation of explosion relief.

If explosion-relief panels or doors already exist, check to be certain they are not compromised or rendered inoperable (figure 1). Obstructions such as conduit running over an explosion-relief panel or door will create a restriction and will not allow the panel or door to respond freely as it was intended. In some cases, you may find dangerous “fixes” such as explosion-relief panels that have been permanently affixed to equipment with sheet metal screws or by welding. These “fixes” do not fix a problem, but instead create an even more dangerous one because they prevent the doors from operating properly. If relief panels are on top of the oven, make sure debris is not piled on top of them. Also, ensure that all doors or panels do not have objects wedged into or against them to keep closed.

## Explosion-Relief Hatches and Doors Must be Maintained

Pay attention to friction latches, which look like latches used on many commercial coolers or freezers (figure 2).



Figure 2:  
This explosion-rated friction latch is designed to hold only a specific amount of force; if that force is exceeded, it will pop open and relieve pressure. This friction latch has not been compromised and is clear of obstructions.

Oven and furnace friction latches are precision designed devices that are there to save your life.

These devices are designed to hold only a specific amount of force; if that force is exceeded, they are designed to pop open and relieve. They must be in good condition to do this.

Also, the explosion-relief doors to which they are attached must have hinges that are in good condition, and the doors themselves must be easy to move and swing freely once open. You should regularly inspect for subtle signs of danger, such as people having removed the friction latches or having installed pins in their place to hold warped, sagging doors tightly to an oven (figure 3). Removing or compromising these important safety devices puts you and your colleagues at risk in the case of uncontrolled ignition of flammables.



Figure 3:  
This friction latch has been disabled and a locking pin has been installed to replace it. Modifications such as this prevent the explosion-relief latch from operating properly should a buildup of gases occur in the oven.

Also, verify that retaining devices are installed properly on explosion-relief doors. Typically, these are chains that are attached from the oven or furnace to the explosion-relief door. These retaining devices allow the explosion-relief door to open to relieve pressure, but prevent them from flying off and becoming a projectile in the event of an oven or furnace incident.

## ABOUT US

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.

## Make Things Not-So-Subtle

Now that you know more about explosion relief, take the next step and label all of your explosion-relief panels and doors as NFPA 86 suggests. Section 5.3.4.2 of the standard states: "Warning signs shall be posted on the vents." Operators should understand that it is not good practice to stand near explosion-relief doors during light-off; in fact, these areas should be avoided at all times. Likewise, everyone should understand what friction latches are and why they are there.

Sharing this information may go a long way toward minimizing the knowledge gap many operators and users of combustion equipment seem to have regarding explosion-relief equipment. It is better to have a place where unexpected, instantaneous explosion forces can go and do as little harm as possible than for shrapnel and flying debris be created.

Remember that it is key to look for subtle signs. Also, make sure that your oven or furnace has explosion relief and is designed according to the current edition of NFPA 86.

### 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.

### Honeywell Process Solutions

Honeywell Combustion Safety  
2100 Apollo Drive  
Brook Park, OH 44142 USA  
Tel: +1 216-749-2992

SF-17-21-US  
November 2017  
© 2017 Honeywell International Inc.

**Honeywell**