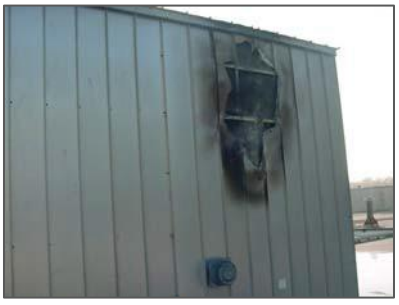
Honeywell Combustion Safety
11699 Brookpark Road
Cleveland, Ohio 44130
www.combustionsafety.com

Fuel Train Vent Valve Issues

There are many issues that plant/facility personnel need to be aware of when considering fuel train(s) valve configuration as it relates to safety. Valves are intended to regulate pressure and the amount of gas flowing through the unit; they are vitally important to the safe operation of fuel-fired equipment. However, without proper installation, regular inspections and maintenance, there are a wide variety of risks that can surface that those working with and around the equipment must be able to identify and mitigate.

The classic double block and bleed vent arrangement seems to be an absolute safety no brainer. The normally open (open when it's not powered) vent valve allows any leakage past the safety shut off valve to get outside to a "safe place" via the installed vent. All valves can leak, so how could this ever be a problem?

The photographs below show what can happen if one of these valves goes bad. It depicts a fire that ignited on the outside of a roof top heating unit at an industrial plant. The solenoid coil on the vent valve shorted out and burned, causing the valve to fail open. A failure of one of these coils or valves, for a variety of reasons, means that a large amount of gas could be escaping through the vent line. If the regulator has sufficient excess capacity, or the gas piping arrangement is just right, the flame could stay lit on the burner indefinitely. If this equipment is in a remote place, like on a roof, there could be a release and/or a fire burning that goes unnoticed for quite a while, as was the case in the photo. Fuel releases like this can become fire or explosion hazards if they accumulate where the concentration becomes 4.3% to 15% by volume, which is the flammable range of natural gas.



Solenoid Style Vent Valve Failure Risks

Manufacturers of solenoid style vent valves recommend that these valves be installed in the horizontal position with the stems pointing up. This mounting position can be very important in the safety of the fuel train. If solenoid coils move even slightly out of position on the stem, severe coil overheating can occur.

If the small retaining clip and/or plate are left off of the solenoid coil, and if the valves are installed with the stem horizontal, it increases the chances of the coil being able to vibrate to an unsafe position where it could easily overheat and burn out.

A burned out solenoid coil should cause a shutdown of the entire fuel train. This would occur only if the valve is fused in series with the other valves in the system. If the solenoid coil is fused separately, there could be big trouble since in a failure, the valve would revert to its normally open position without affecting the other valves. The vent valve would go wide open and release gas to the vent line. If the firing rate is low or the low gas pressure switch does not sense the pressure drop, the unit could remain operating and gas continues to vent for an indeterminate amount of time.

Whether or not a vent valve is used depends primarily on the insurer's requirements, codes, or the company policy. For example, NFPA 85, Boiler Safety Code for Boilers over 12.5 MMBTUH, requires a double block and bleed arrangement on both the pilot and main gas trains. If you must have a vent valve, it can be made safer by thinking about a few important issues.

A. It Doesn't Have to be a Solenoid Valve.

There are other more robust, and more expensive, choices than solenoid valves.

B. Proof of Closure Switches

Vent valves are available with position indication or proof of closure switches. These would indicate to the burner management system that the valve is in an unsafe position and cause a shutdown of the system.

C. Solenoid Valves are Supposed to be Mounted with the Stem Vertical

Read the literature that comes with the valve. The manufacturers recommend that for maximum useful life, they should be installed in a horizontal pipe with the stem/coil facing upward.

Solenoid Valve Installed Correctly

D. Power Through Properly Fused Feeds

Make sure that coils are powered through connections that are fused in series with other valves in the system so that if one fails, the entire unit's fuel supply shuts down.

E. Make Sure Retaining Clips are in Place

Ensure that retaining rings and clips are solidly in place. Leaving these off or improperly secured, can greatly enhance the chances of the coil moving on the valve stem and overheating.

Clip Installed Properly

F. Listen for Buzzing, Look for Overheating

Vent valves can overheat from having dirt or debris trapped between the stem and seat. This condition is sometimes accompanied by a buzzing sound because the valve is trying to close and is not being successful. Review coils for signs of overheating like scorched or discolored paint.

Coil Leaving the Valve Stem

G. Where is the Vent Termination?

Vent terminations need to be to a “safe place.” “Safe place” is not defined in any of the codes. Industry guidelines or best practices for what a “safe” vent termination is includes the following:

1. Protected with a vent screen device and turned down to avoid rain water.
2. Includes an annual check of the discharge to make sure it’s not clogged.
3. At least 10’ away from any air intake or air handler.
4. At least 3’ above any air intake or air handler.
5. Away from possible ignition sources.

Vent near Air Intake

If a solenoid coil or vent valve leakage problem is discovered, do not operate the equipment.

Honeywell Combustion Safety, formerly CEC Combustion Safety, LLC, has been in business since 1984. With engineers and staff members that sit on Code committees such as ASME CSD-1, 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. Contact us at +1 216.749.2992 or visit www.combustionsafety.com for additional information.