

# Safe and Efficient Testing for Gas Train Safety

## Safety Note

Safe and efficient gas train component testing is everyone's goal. However, there are risks associated with various test methods and equipment that must be understood to make testing easier and more accurate. There are two possible approaches: one centers around the use of palm or 3-way valves for making access to gas train components easier; while the other focuses on the use of momentary switches to make tightness testing of safety shut-off, blocking, and vent valves safer and easier.

### Basic High/Low Gas Pressure Switch Testing

There are numerous methods to test gas train pressure switches. These range from changing set points to removing switches for bench testing. Changing set points is the least desirable method, but is often the easiest. When set points are temporarily changed a number of risk factors occur:

- a) The technician may forget to reset the device to the original set point.
- b) The technician may not reset the device accurately.
- c) The device may not trip at the same system pressure despite the technician moving the scale back to the same point.
- d) The device may still not trip at its set point even though it has tripped at a different alternate test set point.

The most preferable method is bench testing. In this case, the device is removed from the equipment and tested with an external pressure source. This is expensive, time consuming, and carries another set of risks which include:

- a) The technician may mishandle the device during removal or reinstallation.
- b) The reinstallation could cause piping leakage.
- c) The removal and reinstallation may carry an electric shock risk.

Testing switches with an external pressure source while they are on a piece of equipment is another method that bears consideration. In this case, the following risks need to be managed:

- a) The technician faces the possibility of damaging other components while pressurizing the system.
- b) The technician faces the risk of gas leaks and being exposed to natural gas.
- c) Air is injected into the piping system making for the possibility of a flammable mixture in the piping system.

## Palm or Three-way Valves to Enhance Testing Access

The use of momentary palm switches or 3-way valves to retrofit to gas trains makes it possible to test an external pressure source while components are still installed. One must be very careful in the selection of the specific momentary palm valve and be sure that it is approved by the authority having jurisdiction. This system is in use in a number of major facilities and has worked to enhance the quality of regularly performed testing.

## Make sure that all equipment is properly locked out and made safe prior to attempting any testing

When using the palm valve or 3-way system for testing low-gas pressure switches, one would close the main manual valve and leak test it. This would trap gas downstream, between it and the safety shut-off valve (SSOV). By actuating (holding in) the palm valve, the port would open; draining a small amount of gas to the surrounding area.



Likewise, a 3-way valve could be positioned to perform the same function. This would put the gas pressure immediately below the switch to atmospheric pressure. The unit should not be able to light off. In this case, an external pressure source could then be connected to the vent port, and with the palm valve being held open, the switch could be pumped up to its set point in an accurate manner until a volt ohm or continuity tester indicated a switch trip.

The proper installation of either palm valves or 3-way valves to enhance serviceability is critical to achieving a safer, more functional installation. If the installation is not done properly, safety can be severely compromised.

## An important issue is compliance with NFPA 86, section 8.2.8

**8.2.8** - Safety devices shall not be bypassed electrically or mechanically.

**8.2.8.1** - This requirement shall not prohibit safety device testing and maintenance in accordance with 8.2.5. Where a system includes a "built-in" test mechanism that bypasses any safety device, it shall be interlocked to prevent operation of the system while the device is in the test mode, unless listed for that specific purpose.

A palm valve or 3-way valve that has a vent port open to the low gas pressure switch sensing line drains away a small volume of gas and trips the switch. This prevents firing and serves as an interlock. Hence, the valve cannot be left by mistake in a compromising position and the equipment run. If, on the other hand, this same valve is installed on the high gas pressure switch, it can be left or failed in a position that allows for the switch function to be compromised. In this case, the vent being open on a high gas pressure switch line would bleed off pressure in such a way that the switch would not accurately sense the gas train pressure.



In our opinion, the installation of these kinds of test valves only meets the intent of 8.2.8 when they are installed to make for an interlock by having both switches (high and low gas pressure) taken off from the same sensing line.

When selecting a palm button valve or a 3-way valve for this kind of service, we have not found any that are listed for natural gas use. Instead, many are WOG, (water, oil, gas), rated; however, the WOG designation is not the same as having a specific rating for natural gas. NFPA 86 makes provisions for this in sections 8.2.1 – 8.2.3 that reads as follows.

**8.2.1\*** Except as permitted by Section 8.4, combustion safeguards, flame detectors, excess temperature limit interlocks and safety shutoff valves shall be listed for combustion safety service or approved if a listed device is not commercially available.

**8.2.2\*** Safety devices not identified in 8.2.1 shall be listed for the service intended or approved if a listed device is not commercially available.

**8.2.3\*** Safety devices shall be applied and installed in accordance with this standard and the manufacturer's instructions.

This means that if you choose to apply a palm or a 3-way valve you will need to get written approval by your insurer or authority having jurisdiction for not only the new configuration but the specific manufacturer of the valve.

When considering 3-way valves and palm valves, make sure that potential issues are considered, such as seals that are installed. In some cases, if using a fuel other than natural gas, corrosion and seal leakage can be an issue. For example, some landfill gasses and off-gasses from refinery and chemical operations require special seal considerations.

In selecting between palm valves and 3-way valves, each method has pros and cons. 3-way valves offer the benefit of having a spring return. However, this can easily be defeated with a piece of duct tape over the palm actuator. They are also generally not lockable. We have found a manufacturer of 3-way valves in the size range and rating required that offers a lockable valve. This provides the benefit of being able to secure the valve in a safe position.

Another hazard to consider with palm valves and/or 3-way valves is the proper treatment of the vent ports. In all cases, these vents must never be plugged or valved off. This can defeat the safety interlock feature of the installation method proposed.

## **Momentary Switches for Tightness Testing Safety/Speed**

Tightness testing of safety shut off valves (SSOV), blocking, and vent valves can expose technicians to elements of risk. Caution must be used when setting valves into a test position. Technicians must typically put each valve into a position where natural gas pressure is exerted on one side, while the other side is a tightly sealed section of pipe except for the leakage measuring outlet. This is usually done through the use of temporary wires, commonly known as "jumper wires," in panels by experienced electricians. In any case, care must be taken to be sure that a safe process is developed for your specific equipment and its configuration. This means the lockout and isolation of power and fuel sources while testing is taking place. Technicians manipulating valves and systems to get each valve sequentially into the proper position face the risk of electrical shock and the possibility that temporary jumper wires are incorrectly installed or left in panels by-passing critical safety circuitry.

Many sites have purchased new equipment configured with testing mode switches that allow valves to be manipulated with equipment off without the need for electricians to enter panels to install temporary test wiring. In many cases, sites have retrofit equipment to include these switches.

When retrofitting a panel to accomplish more safe and efficient testing capabilities, make sure to have modifications reviewed and approved by the authority having jurisdiction – for example, your insurance company. Most major insurers are familiar with this kind of capability and have provided approval in the past.

## 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.

### **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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