

## EXPLOSION ISOLATION SYSTEM

### BACKGROUND

Explosion protection, such as explosion venting or explosion suppression, have been widely practiced for many years, explosion isolation has only recently been recognized in the United States. The 1997 edition of National Fire Protection Association's (NFPA 69) Standard provides guidance on the subject.

Due to the relative infancy of explosion isolation in the United States, there may be many explosion protection systems installed today that were designed without considering the need for explosion isolation. Therefore, many processes currently in operation using protection methods such as explosion venting, explosion suppression or others, could benefit from the addition of explosion isolation.

### FIKE FIRSTS IN EXPLOSION PROTECTION

- 1980: First to import European manufactured explosion isolation valves to test and enhance them for specific customers.
- 1989: First U.S. manufacturer to offer a complete explosion isolation systems using fast-acting knife gate valves.
- 1991: First U.S. manufacturer to supply large scale explosion isolation valves (36 IN diameter).
- 1992: First U.S. manufacturer to offer explosion isolation systems using conduit-style valves specially designed and built for the expressed purpose of explosion isolation.
- 1997: First U.S. manufacturer to use gas cartridge actuators in lieu of class B explosives to initiate valve closure.
- 1998: First to use gas cartridge actuator exclusively to close valve.

### CONCEPT OF EXPLOSION ISOLATION

The concept of explosion isolation is to prevent flame propagation from one piece of process equipment to another or to a personnel occupied area. In practical terms, this means that process areas can be zoned to minimize the affects of downtime in the event of an explosion.

A good example is a dust collector. If a process explosion becomes reality, explosion vents (such as those manufactured by Fike) will provide adequate overpressure protection to the dust collector. However, flame and pressure from the explosion can travel through connected piping or ductwork; in most cases overcoming process flow rates. Unless some means of explosion isolation is provided to block flame and pressure propagation, the consequences of this flame propagation include further process damage and possibly explosions in other equipment in the process.

### MECHANICAL EXPLOSION ISOLATION

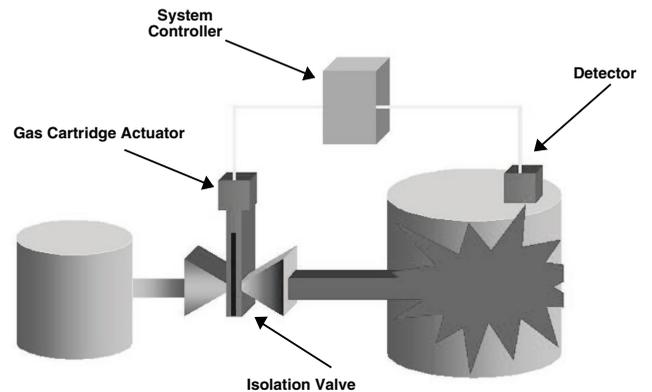
Fike, the world leader in the design and manufacture of explosion protection systems has developed a fast-acting conduit style valve (Explosion Isolation Valve or EIV) designed specifically to close in milliseconds to provide a mechanical barrier against both flame and pressure. The Fike EIV can be applied to block the flame and pressure from both directions in the piping and may be used in conjunction with other explosion protection methods such as explosion venting or explosion suppression. This makes it one of the most versatile isolation methods of protection available. As described on the Fike data sheet, the Fike EIV is available in a wide range of standard sizes with 304 stainless steel wetted parts as standard material. For specific information, see Isolation Valve Data Sheet X.1.32.01.

### HOW MUCH DOES THE FIKE EIV SYSTEM WORK

In most applications, fixed point pressure detectors are interfaced with a Fike control panel that monitors the system under normal operation. When an explosion is detected, the control panel signals the Fike EIV to close, creating a positive mechanical isolation barrier.

### EXPLOSION PRESSURE DETECTORS

Fike offers a variety of explosion pressure detectors and mounting configurations to meet your process requirements. Before it ships to you, each pressure detector is response tested at Fike to confirm that its dynamic response time is within acceptable limits. Fike pressure detectors also offer the benefit of being field adjustable (within limits) so that they can be reset in the event that your process conditions change. For specific information, see Fike Detector Data Sheet X.1.03.01.



*Schematic of Explosion Isolation System. Detector senses onset of deflagration, sends signal to control panel which in turn closes valve and stops flame and pressure transmission*

## HOW DOES THE FIKE EIV SYSTEM WORK

Fike control panels are specially designed for the demanding requirements of industrial explosion protection. Each controller undergoes a full diagnostic checkout as part of its final inspection. For specific information, see Data Sheet X.1.01.01.

## CHEMICAL EXPLOSION ISOLATION

Chemical explosion isolation utilizes the same control and explosion detection devices as the mechanical EIV. Rather than using a mechanical valve, this technique employs the same chemicals that are used in Fike explosion suppression systems. As with the EIV, the specific focus is to block the path of flames through process piping or ductwork. Unlike the Fike EIV, chemical isolation does not offer the benefits of a physical barrier and some transmission of pressure will still take place. Generally, chemical isolation is used in conjunction with explosion suppression systems or in applications that involve extremely large ductwork.

## WHAT INFORMATION IS NECESSARY TO DESIGN AN EXPLOSION ISOLATION SYSTEM

The primary variables that need to be identified to allow proper design are the line size (diameter and length) and the burning characteristics of the fuel. In the case of dusts, the burning characteristic is described by the  $K_{st}$  value established in bench scale tests. In the case of gases, the fundamental burning velocity is needed. Other design considerations include: process operating pressures, process operating temperatures, process layout, and others depending on your specific application.

To assist you in determining the combustion characteristics of your specific media, Fike maintains the most comprehensive combustion testing facility in North America. See the Fike Explosion Testing Services Data Sheet X.1.36.01 for specific information.

## APPROVALS AND SYSTEM VERIFICATION

Fike Explosion Isolation Systems have undergone rigorous third-party testing and verification by both the world renowned Ciba in Switzerland and the FSA test laboratories in Germany.