Rapid Acting Isolation

Explosion Isolation

Vessels in a process are usually connected by pipes or ducting. An explosion that originates in one vessel, can quickly propagate along pipes starting more explosions in connected vessels.

In the design of a process it is important to take into account the following factors:-

Explosions may propagate from one vessel to another

An explosion may re-ignite due to introduction of fresh air or combustible material

Smouldering particles may be transferred causing fires or explosions in other vessels

Explosions in unprotected vessels may lead to a devastating secondary explosion inside the building

Potential for Propagation

If the pipeline or duct can withstand the explosion pressure, the flame can propagate and achieve high flame speeds and pressures. If transferred into a connected vessel, flame jet ignition can occur. In this instance the gas flow and turbulence ahead of the flame can create conditions where accelerated burning can take place. It is possible, even if the connected vessel is protected by venting for instance, that the explosion can be much more violent and possibly overwhelm the protection device, thus causing the vessel to rupture.

Design

Wherever possible the process and vessels should be designed to ensure that explosions cannot propagate from one vessel to another by incorporating isolation devices, such as rotary gate valves and sealed screw conveyors. Alternatively the entire process could be constructed to withstand the maximum explosion pressure.

If this is not possible then explosion isolation measures may need to be taken.

Isolation Systems

An explosion isolation system comprises three elements:-

Interface control unit

Detector

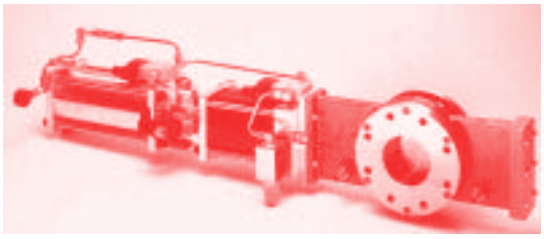
Isolation device or valve

The interface unit provides the connection between the process, detection device and isolation valve. It provides alarm contacts to shut the process down in the event of explosion detection. It also monitors the detection and activation lines for short and open circuit conditions.

The explosion can be detected in a number of different ways. The most simple way to activate an isolation system is to use a switch which is connected to explosion vents on the vessels. When the vent opens, the circuit is broken and the interface unit activates the isolation valve. Alternatively discrete devices can be used such as spark/optical sensors or pressure sensors. Pressure sensors can detect using either static pressure threshold or rate of pressure rise functions.

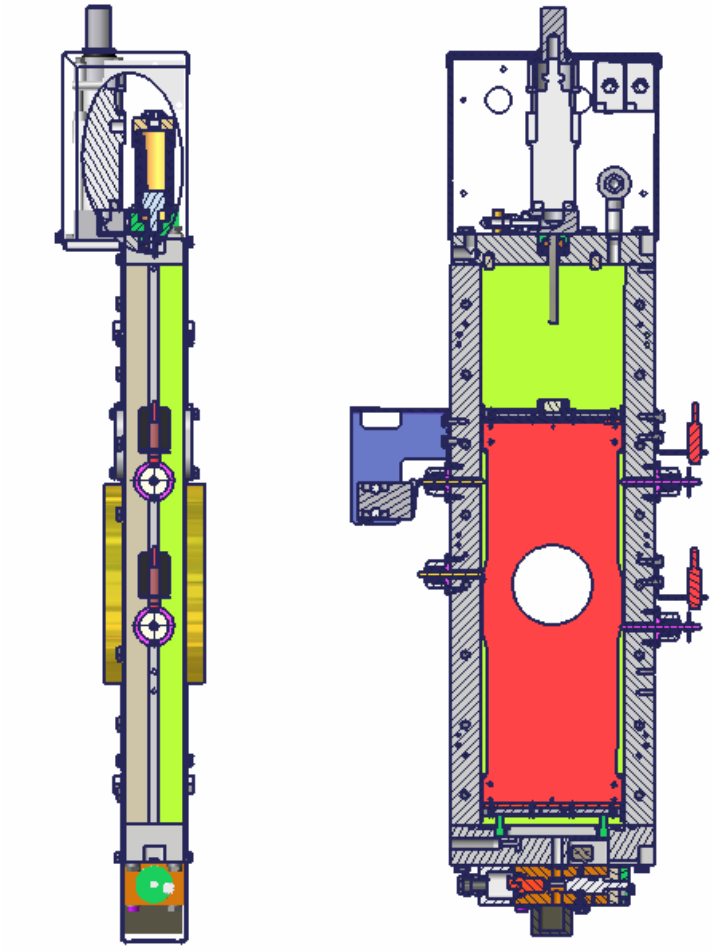
Isolation Valves

Generally, the most popular method of mechanical isolation is a knife gate valve. Using a full bore slide, the valves close in under 100mS. The method of activation is achieved in two ways. One device GT uses compressed air at 5-6 barg. It incorporates its own reservoir and uses a high speed solenoid valve to pressurize a cylinder which forces a piston to move and drives the valve slide into the closed position.



Another type of valve known as the RSV uses a small gas generator which is ignited on receipt of a signal from the interface unit. Again the gas is used to drive a piston attached to the valve slide. This valve is often used where there is no compressed air supply available.

Both devices can be easily reset although the RSV device must have a new gas generator installed by a trained engineer.



Euratex Limited
22 Prospect Place
Hipley Street
Woking
Surrey GU22 9LP

Tel: +44 (0)1483 901311
Fax: +44 (0)1483 433313
www.euratex.co.uk