

Protection against dust and gas explosions

FULLY COMMITTED TO EXPLOSION PROTECTION

Historically accounting for less than 4 percent of all business interruptions, dust and gas explosions can be considered an uncommon event. So wouldn't it be better not to dwell on this and to simply hope that an explosion won't happen in your facility?

Text: Stephan Fabrizius Photography: iStock.com, HOERBIGER

Not a good idea. After all, explosions are responsible for 40 percent of all losses experienced by companies – four times higher than the amount of losses from all other causes including fire. Such an event can greatly impact the ongoing operation of facilities that process a wide range of materials, such as flour, paper, starch, sugar, and plastics – just to name a few. When an explosion occurs in an industrial processing operation, the consequences are often devastating. Statistically, every explosion in an industrial plant causes financial damage to the tune of 2.8 million euros – not to mention injuries suffered by employees and damage to the community. To assist in preventing such losses, HOERBIGER Safety Solutions provides prevention and comprehensive protection solutions specifically designed to protect the customer’s staff and operation.

Explosion protection on an uptrend

Due to progressing harmonization of explosion protection standards and legislation, plant operators are becoming increasingly aware of the potential consequences of an explosion. Advanced protection solutions and experts who design, install, and service them are increasingly in demand. Even though the market for safety solutions has undergone appreciable growth, this trend still offers potential for expansion in many countries. With this in mind, the HOERBIGER Safety Division has decisively enhanced its portfolio of system solutions, among other things by acquiring the renowned IEP Technologies and Newson Gale brands.

All-encompassing strategy for prevention, venting, and isolation

The risk of gas or dust explosions essentially exists wherever flammable gases or combustible solids, oxygen, dispersion, and an ignition source come together in an enclosed space. Fuels include not only combustible gases or vapors from volatile chemicals, but also dust. The smaller and drier the dust particles, or the more flammable the gas, the more ideal are the conditions for these materials to be ignited by sources as common as an overheated bearing, for example – which is all it takes for an explosion to occur.

“Our employees have extremely comprehensive know-how and are able to offer our customers protective solutions that are optimized to their individual situation.”

Markus Häseli,
Director of Sales Europe at IEP Technologies

Electrostatic charging inside production equipment during operation also presents a potential ignition source. HOERBIGER addresses this situation with its Newson Gale range of static grounding and bonding protection solutions. The core of this portfolio consists of technologies that are specifically designed to prevent or dissipate static electricity in plants and reduce the likelihood of a spark ignition. Prevention is one side of the coin – but what happens when, despite all precautions, a dust explosion occurs after all? This is where proven and effective explosion protection technologies provided by IEP Technologies including venting, isolation, and suppression are required. These solutions can be categorized into passive and active protection.

The most common approach to passive explosion protection is to utilize explosion relief vents within the protected process equipment. Standard rupture vents in effect create a weak point within the vessel wall, which is designed to open at a certain pressure that is below the pressure at which the protected vessel itself would rupture. This type of vent relieves pressure effectively, but this pressure, and the associated fireball, must be directed to a safe area. This is typically a cost-effective protection option if the vessel being protected is located outside of the building or, if inside, is located near an external wall allowing ducting to the outside.

Prevention

Grounding



When there is a risk of electrostatic charging



Grounding systems reduce the likelihood of a spark ignition



When an explosion occurs due to another ignition source

Passive explosion protection

Explosion venting



When pressure can be relieved to a safe area

Explosion vents for pressure relief to the outside



Relief valve (above) and rupture vent with flame arrester (below) for flameless pressure relief



The HOERBIGER Safety Portfolio

A range of flameless venting solutions are also available to allow venting indoors in certain situations. These either employ an essentially maintenance-free relief valve, which closes automatically after the pressure has been relieved, or a conventional rupture vent, which is combined with a flame arrester. Both products prevent flames from escaping the facility.

If passive protection such as venting is not possible, active explosion suppression is the product of choice. A pressure sensor detects the incipient explosion based on a sudden pressure rise inside the protected vessel within 10 milliseconds after

ignition. This signals the control unit to immediately discharge the suppressant, which dissipates the heat and extinguishes the explosion while still in its incipient stage.

The protective measures are rounded out by appropriate isolation systems. These prevent explosions from propagating through interconnected ducts to other parts of the process. Explosion isolation measures are consequently a fundamental component of comprehensive explosion protection concepts. Solutions for passive isolation include flap valves that are held open by operating pressure and are closed by the initial explosion pressure, thereby creating a barrier within

Active explosion protection

Decoupling

Explosion suppression



When safe pressure relief is not possible



Suppressant dissipates the heat and extinguishes the explosion while in the incipient stage



Explosion isolation



When there is a risk of an explosion propagating through ducts and lines

Passive

Active



The explosion pressure closes flap valves, thereby creating a barrier within the duct



Barriers of chemical suppressants (left) or high-speed gate valves (above) are activated when increased pressure is detected

the duct. Active isolation includes high-speed gate valves or barriers of chemical suppressant, which are activated at the time the increased pressure is detected.

Custom system solutions and services offer added value

Effective explosion protection requires quality products and safety systems for practical implementation. The strategic approach pursued by HOERBIGER Safety Solutions as a full-service provider takes it even one step further. “We are one of the few full-service providers in the market,” comments

Markus Häseli, Director of Sales Europe at IEP Technologies. “Our employees have extremely comprehensive know-how and are able to offer our customers protective solutions that are optimized to their individual situation – technologically as well as economically.”

Close contact with the customer and in-depth on-site consulting are among the pillars of the HOERBIGER business model. These endeavors are paying off: a growing number of customers in the international market trust in the systems’ high quality and concept design, which is tailored to their specific needs.