

# Your partner for comprehensive industrial explosion protection

*Together we save lives.*



# Industrial explosion protection from a single source

**Is your process equipment at risk of an explosion?**

**We combine explosion protection solutions under one roof**

Explosion hazards are present in many plants. A wide variety of ways exist to deal with these risks but how do you know which is the best solution for your process?

In HOERBIGER, you have found a partner that is there for you and able to answer your questions. Together with you, our experts with decades of experience will develop your custom protection solutions which you can rely on.



IEP Technologies, with over 60 years protecting the world's industrial processes and a member of HOERBIGER Safety Solutions since 2015, is the world's leading provider of explosion protection systems and services. IEP Technologies suppression, isolation, and venting solutions reliably and efficiently protect employees and equipment from the devastating consequences of industrial explosions.

Saving lives through explosion prevention and protection is the role of the IEP Technologies, Newson Gale and Brilex brands at HOERBIGER. Regardless of the types of processes, requirements, and general technical conditions, or whether new equipment or upgrades to existing components are involved: We are the right partner for you.



Newson Gale, as of January 2016 also a HOERBIGER Safety Solutions Company, holds a market leader position in the prevention of dangerous static electricity in potentially explosive areas by having decades of experience in mitigating fire and explosion risks from electrostatic spark discharges.



Brilex, a benchmark in passive explosion protection, became part of HOERBIGER Safety Solutions in April 2016. The portfolio of the prominent manufacturer of single-piece rupture disks ideally complements the range of products. Decades of experience in the manufacture of venting systems for the most challenging process conditions make Brilex an integral part of HOERBIGER's explosion protection.



# Explosion hazards - not to be underestimated

**Less than 5% of all process downtime is caused by explosions. At the same time, explosion damage causes almost 40% of losses.**

Explosions pose a serious hazard to people, equipment, and to the environment. Insurance carriers report damage of almost 2 million dollars on average per event for dust explosions alone. In addition to direct costs related to damaged equipment, a crucial factor is also the interruption of the ongoing operation. Much more important than material damage, however, is the threat to people's lives, which must be protected under all circumstances.

Potentially hazardous combinations of processes conditions and corresponding physical properties of stored, transported and processed material occur across a multitude of sectors of industry including these to name just a few:

- food processing
- power / biomass
- oil and gas
- chemicals
- pharmaceutical
- wood and paper
- paints & pigments
- plastics
- metal

Virtually any flammable substance can turn explosive if conditions are right.

# How industrial explosions develop

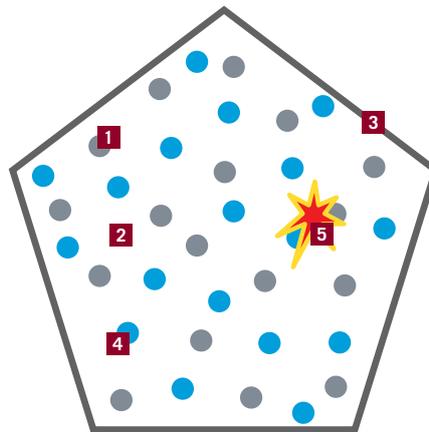
**Five factors must be present for an explosion to develop.**

**1** Fuel that can be ignited based on its physical properties. This also includes dust and fine particles of materials that normally are not considered flammable. This is why not only combustible gases or volatile vapors, but also foods or metal dust can pose an explosion risk given the right circumstances.

**4** Sufficient oxygen supply – typically from the air and available in almost any process – is the basic prerequisite for explosions and fires.

**2** Physical dispersion (e.g., stirring up fuel or mixing with air). A large surface increases the speed of the reaction, e.g., with oxygen in the air.

**3** Physical confinement of a dust or gas cloud in an enclosed space such as a process vessel. In the event of ignition, the pressure in the vessel rises quickly, causing it to rupture.



**5** An ignition source that reaches or exceeds the minimum amount of energy needed to ignite the particular fuel. Electrostatic discharge, mechanical sparks and friction are examples of common ignition sources that can trigger explosions.

# Facing the danger

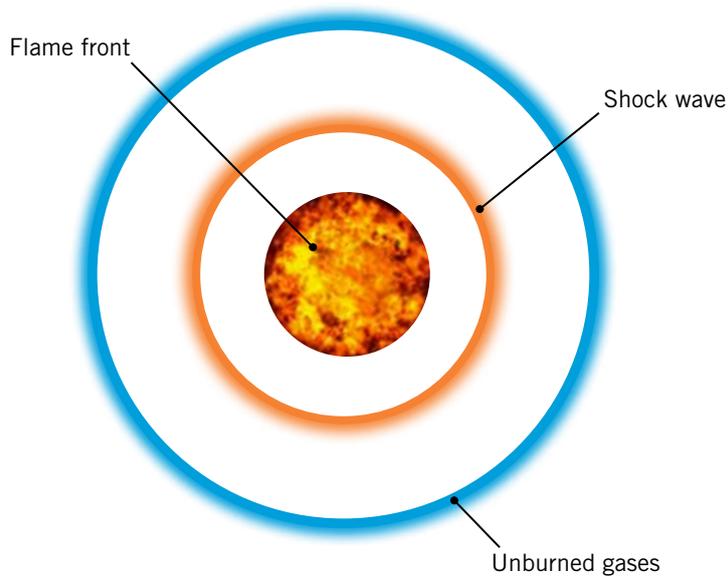
**The composition of a propagating explosion is more complex than it may appear.**

Starting from an ignition source, which ignites the process material, the flame front develops. Shortly after development, it moves relatively slowly at first, expanding at ever greater speed as the volume increases. At the same time, the shock wave originating from it moves at the speed of sound, pushing

unburned gases ahead of it. The shock wave is the part of an industrial explosion which results in initial damage. Without special measures, few process vessels are designed to withstand this pressure and rupture under the stress.

## **Consequential damage and secondary explosions**

This initial explosion can certainly result in severe damage and possible injury from flying debris however the greatest risk may quickly follow. Once the integrity of a container is compromised, the shock wave and flame front will be expelled into the plant. The shock wave can stir up dust which had settled on any horizontal surface, which is immediately ignited by the flame front. If the explosion propagates through a pipe, it can also trigger secondary ignitions in connected process vessels. It has been quite well documented that the initial explosion can destroy a process but it is the secondary explosion that can level the entire facility.



# Industrial explosion protection – what to do?

**Two fundamental principles offer increased safety: reducing risks for industrial explosions and limiting their impact.**

Production processes, material properties, and potential risks must be linked to each other. Tailoring the proper solution given the operating process specific parameters requires years of process protection experience and a complete range of protection hardware.

## Preventive explosion protection

All measures that are taken to prevent explosions address some aspect of the five requirements for its development. In production processes, however, some factors simply cannot be avoided. Fuel is always present: a flour mill, for example, will always produce dust. Likewise, physical dispersion is common given mixing and conveying operations. What can in fact be controlled is the supply of oxygen to areas at risk of explosions. Inerting the process with gases is effective, but cost-intensive and complex to implement. An effective and efficient solution is the suppression of ignition sources: where there is no ignition energy, there is no explosion. Compared to mechanical or electrical sparks, electrostatic charges are often underestimated, yet they hold major potential for spontaneous ignition.

## Mitigation of explosion effects

In many instances, explosions unfortunately cannot be prevented with certainty. Explosion mitigation efforts are therefore aimed at preventing their propagation and limiting the effects on the surroundings. Suppression systems are designed to „quench“ explosions in their earliest stage. Explosion isolation systems are designed to prevent the explosion from propagating between interconnect process vessels and the plant, while controlled venting solutions may ensure that sudden overpressure can be relieved in a safe manner to the outdoors or perhaps within the plant if necessary by use of a flameless venting technology.

# Suppression solutions

**Detect and suppress explosions in milliseconds.**



*EX8000*

- Designed specifically for each application
- Dynamic rate of rise pressure detection
- Single & Multi-Zone control systems
- Global system approvals (FM & ATEX)

In a matter of milliseconds, our suppression systems are designed to detect the buildup of pressure at the earliest stages of an explosion within a process vessel and discharge a suppressant before destructive pressures develop.

The suppressant works by interfering with the explosion's reaction, by removing heat from the deflagration's flame front and thereby lowering its temperature below that needed to support combustion.

The explosion suppressant also creates a barrier between the unburnt combustible particles to prevent the further transfer of heat.



*MEX detector*



*EHRD suppressors*

# Isolation solutions

**Complete range of isolation solutions – active & passive.**

- Full range of active and passive solutions
- Mechanical and chemical systems
- Designed to reduce process interruption

Isolation systems are designed to work alongside a suppression or venting system to mitigate the risk of the deflagration from travelling between interconnected equipment within your process.

The chemical type isolation method discharges an explosion suppressant into pipeline/ductwork mitigating the passage of flame and burning materials to interconnected equipment.

The mechanical type isolation method can be designed using either an “active” product such as the IEP Technologies high speed knife valve or a “passive” product such as our ProFlapPlus or Ventex systems. Each of these provide a mechanical barrier which isolates the deflagration event.



*Passive isolation*



*Active High Speed Isolation Valve*

# Venting solutions

**Relieve destructive explosion pressure safely.**

- Fully ATEX compliant and certified
- Complete range of sizes to fit every application
- High vacuum resistant capability
- Global availability

An explosion vent is a relief device that ruptures at a predetermined pressure to allow the fireball and destructive pressure to vent to a safe area.

Rupture style vents are economical to install and these highly efficient vents fit into the walls of a process vessel.

They are available in a variety of sizes, configurations and materials to ensure fast reliable operation during an explosion event.



*Vent panels*

# Flameless venting solutions

**Relieve destructive explosion pressure without flame ejection.**

- Flexible design with a variety of models
- Little to no post-explosion refurbishment
- Indoor venting solutions

We also offer a range of Flameless Vents which are designed to quench the flame front and relieve the pressure.

Our flameless vents are typically used in applications which cannot be vented to a safe, outside area. We offer a range of styles each with an integrated flame arrester designed to provide flameless pressure relief.

The revolutionary EVN 2.0 flameless vent has a low-mass valve plate and low response pressure. This flameless vent reacts within fractions of a second in the event of an explosion. Following an explosion, they immediately seal again, lowering the risk of secondary explosions and costly replacement.

The Indoor Vent (IV) makes venting into confined spaces possible. A vent panel with a ceramic flame arrester retains dust particles and cools down the explosion to a safe level.

The Indoor Vent EXL extends the IV Series with adaptable modules for an effective explosion vent area from 1900cm<sup>2</sup> up to 3100cm<sup>2</sup>. The system can be reused after activation.



*EVN 2.0*



*Indoor Vent*



*Indoor Vent EXL*

# Monitored static grounding solutions

## Controlling electrostatic hazards with system interlocks and visual indication.

- ATEX / IECEx / CSA approved
- Simple GO / NO GO indication for operators
- Output contacts to stop operations if grounding is not present

The Earth-Rite® range of static grounding systems offer the highest levels of protection from electrostatic ignition hazards. All Earth-Rite® systems feature electronics that continuously monitor the ground path resistance between the object requiring static grounding protection and a verified grounding point, simple GO / NO GO operator interfaces with LED indicators and internal relays that can

be interlocked with the liquid or powder transfer equipment that can stop the process generating electrostatic charges if grounding protection is not in place.

Each Earth-Rite® system has been developed for specific applications encompassing road tankers, vacuum tankers, Type C FIBC, railcars, metal IBCs, stretching to applications that require the grounding of multiple components with a single static grounding system.



Earth-Rite® RTR

# Visually indicated static grounding solutions

## Controlling electrostatic hazards with visual indication.



*Bond-Rite® EZ*



*Bond-Rite® REMOTE*

- ATEX / IECEx / CSA approved
- Simple GO / NO GO indication for operators
- Flexible range of installation options

The Bond-Rite® range provides a „middle ground“ between grounding systems with interlock capability and passive grounding clamps, by enabling operators identify a low resistance ground path via a pulsing green LED indicator. Customers are provided with the option of having the ground status indicator mounted in a grounding clamp or in a separate wall mounted indicator station. All Bond-Rites continuously monitor the ground path resistance for the duration of the operation.

Installation speed and flexibility is a critical attribute of this range. Battery powered units can be up and running in a matter of minutes whereas as the EX/HAZLOC certified 230 V / 110 V AC power supply can provide power for up to 10 Bond-Rite® wall mounted indicator stations.

# Passive static grounding solutions

## Controlling electrostatic hazards with FM / ATEX approved grounding clamps.

- ATEX / FM approved clamps
- Stainless steel construction
- Tungsten carbide teeth

The Cen-Stat range of FM and ATEX approved grounding clamps are designed to operate in tough industrial environments and the approvals they carry “benchmark” their capacity to maintain positive electrical contact with equipment at risk of discharging electrostatic sparks. To gain FM approval Cen-Stat clamps must pass a range of physical tests that ensure they are suitable for use in hazardous area static grounding applications.

The ATEX certification ensures that there are no sources of mechanical sparking present in the construction of the clamp.

All clamps feature a pair of sharpened tungsten carbide teeth that can penetrate electrostatic resistors like rust, coatings and accumulated products like paints and resins. Given the tough environments in which they operate, stainless steel clamps like the X90 and X45 are designed to last.



*Cen-Stat™ clamps*

# Personnel static grounding solutions

## Controlling electrostatic hazards on people.



Personnel Grounding Strap

- Footwear testing to EN and ANSI standards
- Personnel grounding straps

The most effective way of preventing the accumulation of static electricity on people is to ensure their footwear is capable of dissipating electrostatic charges from their body to static dissipative flooring. In order to ensure the footwear is capable of dissipating electrostatic charges, people working in hazardous areas should test their footwear before they enter the hazardous area.

In a matter of seconds, the Sole-Mate footwear tester can verify if the shoes are in the correct range of resistance.

If operators need to lose contact with static dissipative flooring in order to perform a specific operation, a grounding wrist strap can be used to bond the operator to process equipment that is grounded or connect them directly to a true earth grounding point.



Sole-Mate™



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HOERBIGER is active throughout the world as a leading player in the fields of compression technology, drive technology and hydraulics. In 2014, its 7,000 employees achieved sales of approximately 1.1 billion euros. The HOERBIGER brand is synonymous with performance-defining components in compressors, industrial engines and turbines, automobile transmissions, and multifaceted mechanical engineering applications. Innovations in attractive technological market niches are the basis for components, systems and services that offer unique selling propositions and long-term benefits for the customer. Under HOERBIGER, the brands IEP Technologies, Newson Gale and BRILEX provide a comprehensive industrial safety portfolio serving a wide range of applications. For decades, HOERBIGER pressure relief valves have protected large bore engines and industrial plants during oil mist and dust explosions. IEP Technologies is considered the system and service specialist for the entire range of explosion protection in dust and gas environments. Solutions offered by Newson Gale mitigate risks from electrostatic spark discharges. BRILEX is one of the world's leading providers of explosion vents and flameless vents. HOERBIGER Safety Solutions – Together We Save Lives!