

GV Technology, Inc.

Superior Fire & Explosion Protection



A Global Leader in Explosion Protection

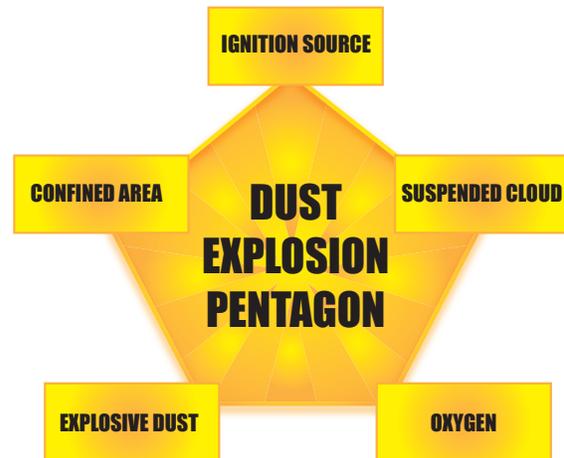
Overview

Recent history has shown us that a single ignition of dust can render a facility useless for weeks, months, or indefinitely. Current statistics estimate that approximately 2-3 dust explosions occur in various facilities in the U.S. per day with a major dust explosion happening every 20 years. Plants that handle powders and bulk solids are even more susceptible. Understanding and preventing these dangerous events is one of the most challenging tasks facing companies today. CV Technology is devoted to the prevention, protection, and mitigation of industrial dust explosions and related fires. Over the years in the industry, we have become one of the world leaders in superior fire and explosion protection design.

Safety and continuity of process are of major value to all companies. The fine particulate materials and production methods commonly used put factories, equipment, process, and employees at risk for catastrophe. The proper strategy for dust explosion protection is unique per situation, per factory, per process, and per company. In order to achieve maximum benefit, each situation must be approached with a clean slate. Every implementation we complete is custom tailored to the specific requirements and conditions within the operation. Anything less is sacrificing optimal result and adding to the risk rather than decreasing it. By minimizing the amount of risk in environments that are susceptible to ignite a dust explosion and implementing the right equipment in the right places, CV Technology provides piece of mind to your company's employees and business process.

In addition to our knowledge in the field of explosions and related fires, we are also business people and understand economics. In today's business climate it is vitally important to protect existing processes in a manner that is effective and economical.

Dust Explosion Pentagon



Dust Explosions are unique and complex phenomena that are as unpredictable as they are dangerous. Although no two dust explosions are ever the same, the five elements listed above in the "Dust Explosion Pentagon" must all be present in order to initiate one of these destructive events.

- 1. Explosive Dust:** The material being handled must be combustible. Some examples are sugar, plastics, coal, grains, flour, starch, and metals.
- 2. Suspended Cloud:** The explosive dust being processed must be entrained in a cloud of sufficient concentration.
- 3. Confined Area:** An enclosed structure surrounding the suspended dust cloud must exist in order to achieve the pressure rise characteristic of a dust explosion. In the absence of a confined area, flash fires are still a hazard but explosions typically are not.
- 4. Oxygen:** O_2 in optimum concentration must be the medium for handling the explosive dust.
- 5. Ignition Source:** When all other elements are present, an ignition source is the last piece of the puzzle needed to activate the dust explosion chemical reaction. Often the most elusive of the five elements, ignition sources can be generated in a multitude of applications and come in a variety of forms. Some examples include smoldering or burning dust, open flames, hot surfaces, heat from mechanical impact and electrical discharges.

**CV Technology fulfills
Explosion Protection Needs for:**

- Dust Collectors
- Fluid Bed Dryers
- Spray Dryers
- Drum Dryers
- Ring Dryers
- Coffee Roasters
- Hammer Mills
- Cyclones
- Blenders
- Pneumatic Convey Systems
- Silos and Bins
- Bucket Elevators

**CV Technology is a Leading Edge
Supplier to:**

- Food and Beverage
- Pharmaceutical
- Dry Goods Processing
- Petrochemical
- Foundries
- Chemical
- Wood Processing
- Paper
- Coal
- Plastics

**Additional Services Provided by
CV Technology:**

- Full range of Dust Testing
- Plant Surveys
- Vessel Analysis
- Start-up and Commissioning of Systems



NFPA and OSHA Standards

On October 18, 2007 the United States Occupational Safety and Health Administration (OSHA) released a directive initiating a National Emphasis Program (NEP) to address the hazards associated with combustible dusts. In the wake of a large explosion at a sugar refining facility OSHA reissued a revised Combustible Dust National Emphasis Program on March 3, 2008.

Currently OSHA does not have a specific standard to address combustible dust hazards. However, the National Fire Protection Agency (NFPA) has several standards that address these hazards. NFPA 654 - Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids is considered the keyway standard for general industry. This standard provides necessary general requirements to both identify combustible dust risks and to manage the risks associated with handling combustible dusts. The responsibility of compliance with applicable standards falls upon the owner / operator of facilities handling combustible dusts.

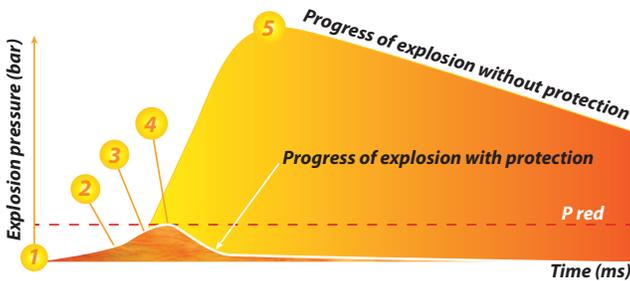
CV Technology is an active committee member of the National Fire Protection Association (NFPA) Standards for combustible dusts. The latest codes and standards are taken into consideration when designing our custom protection solutions. CV Technology offers information sessions for the latest NFPA and OSHA codes and standards. These sessions can be conducted as a lunch and learn or lecture. Contact CV Technology for an onsite codes and standards information session or assessment of your facility.

ISO Certified

All manufacturing at CV Technology is done to the highest quality. Our products are third party independent tested and listed by either ATEX or FM Approvals. CV Technology is an ISO 9001 certified company.

Pred, Pmax and Kst

The maximum pressure developed during an unmitigated dust deflagration is known as the Pmax. The rate at which this maximum pressure is reached as a function of vessel volume is known as the deflagration index, or Kst. Combined, the Pmax and Kst values give the relative severity of a particular dust. If this same dust deflagration, however, is mitigated either through venting or suppression, the maximum pressure developed will be minimized from the Pmax to the Reduced Explosion Pressure, or Pred. The Pred is typically an order of magnitude less than the Pmax and is designed around so that a vessel handling combustible dust is not breached during a deflagration.



- 1 Initiation of Dust Deflagration
- 2 Pstat (Active)
- 3 Pstat (Passive)
- 4 Pred
- 5 Pmax

Passive Vs. Active

Explosion mitigation systems can be categorized into two types of technologies defined as either passive safeguards or active safeguards. CV Technology offers a unique range of products from our Interceptor® line for explosion management that includes both passive and active technologies. By utilizing passive, active, or a combination of both safeguards, CV Technology can design a custom explosion protection solution to mitigate or prevent dust explosion hazards specific to your process needs.

Passive Safeguards:

Passive safeguards encompass technologies that are readily available for use without a complex means of detection or initiation. The most common type of passive safeguard is an explosion vent. Explosion vents are static devices that function automatically by a mechanical means without any monitoring of the process. Advantages of passive safeguards are inherent safety function, low maintenance, economic refurbishment, and limited controls. In addition to explosion vents, other passive safeguards include the; Interceptor®-QR® and Interceptor®-LT™ flameless explosion vents, Interceptor®-VE™ explosion isolation pinch valve, and the Interceptor®-FV™ flap valve.

Active Safeguards:

Active safeguards consist of explosion mitigation solutions that require initiation from a monitoring source such as a pressure or optical sensor. Active protection solutions continually monitor the process conditions and initiate the mitigation equipment upon timely detection of a deflagration. Explosion prevention systems are also an active safeguard that actively detect potential ignition sources and remove them from the hazard area. Active safeguards are ideal for processes handling toxic materials that cannot be exposed to the atmosphere, equipment that has limited access, and indoor vessels. The Interceptor®-HRD™ chemical suppression system and infrared spark detection systems are active type safeguards.

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EXPLOSION VENTS



CV Technology Explosion Rupture Panels allow the dangerous level of pressure generated from a dust deflagration to safely vent from the vessel being protected, eliminating breach and other pressure related failures. Each Explosion Panel is precisely designed to burst at a predetermined pressure to maintain structural integrity of the protected equipment by reducing the pressure produced to a tolerable level.

Explosion Panels offer a passive and economical means of explosion mitigation. As opposed to other mitigation technologies, Explosion Panels feature a simple installation, quick replacement, and a long service life. Burst pressures can be customized for the different operating pressures of industrial processes.

Advantages:

- Highly effective and reliable
- Long service life
- Process friendly
- Resistant to abrasion and weather conditions
- Simple economic installation
- Customized burst pressures
- Wide range of sizes
- Low maintenance
- Easy replacement



INTERCEPTOR-QR

Safe Passive Flameless
Indoor Explosion Venting



Much like Explosion Vents, the Interceptor®-QR® is a passive Explosion Protection technology that mitigates the effects of a dust deflagration by allowing the hot gases and burning material to safely escape the vessel being protected. However, unlike Explosion Vents that simply relieve to atmosphere, the Interceptor®-QR® has a built in quenching chamber that traps the dust emitted from a deflagration and absorbs the heat from the flame and burning gases. The Stainless Steel Mesh that comprises this chamber then acts as a heat sink to quench the temperature and break the chain reaction, effectively interrupting the explosion in mid-stream.

The dust and flame retention capability of the Interceptor®-QR® make it ideal for indoor Explosion Venting applications. With a simple installation, easy refurbishment, and process friendliness, the Interceptor®-QR® is a superior Explosion Mitigation technology.

Advantages:

- Flame Arresting
- Dust Retention
- Negligible Temperature and Pressure Rise
- Simple Economic Installation
- Low maintenance
- Process Friendly
- Economic Refurbishment if Exercised



INTERCEPTOR[®]-LT[™]

Safe Passive Flameless
Explosion Venting

The Interceptor[®]-LT[™] is designed to be a passive, flameless solution for dust explosion relief venting. The flame arresting design eliminates the possibility of a flame from traveling into occupied areas and process equipment. The quenching chamber of the Interceptor[®]-LT[™] is comprised of two cartridges, both assembled with various layers of stainless steel mesh that absorbs the flame and hot gases during a combustion event. In the event of an activation, the Interceptor[®]-LT[™] is designed in such a way that the quenching cartridges can be field replaced with a few simple steps. This requires very little vendor support and makes the Interceptor[®]-LT[™] yet another superior explosion mitigation technology.

Advantages:

- Flame Arresting
- Simple Economic Installation
- Low maintenance
- Process Friendly
- Economic Refurbishment if Exercised
- Integrated burst indicator for signaling activation or explosion isolation protocol



INTERCEPTOR[®]-HRD[™]

High Rate Discharge
Explosion Suppression System

The Interceptor[®]-HRD[™] Explosion Suppression System is an active chemical suppression system for dust explosion mitigation.

The principle of operation for the Interceptor[®]-HRD[™] system is detection of the pressure rise during the initial stage of an explosion, followed by fast injection and homogeneous distribution of an extinguishing agent into the protected vessel. The chemical suppression system consists of a controller, pressure or optical detectors, and the high rate discharge (HRD) bottles.

When a vessel is protected via one of CV Technology's explosion vent options or the Interceptor[®]-HRD[™] chemical suppression system, explosion isolation can be coupled to either technology to provide a complete protection solution. The Interceptor[®]-HRD[™] explosion isolation system utilizes a state of the art optical or pressure detector for triggering ultra high speed explosion isolation protocol.

Advantages:

- Flame and Particulate Retention
- Advanced Pressure Detectors and Controls
- The Micro Gas Generator (MGG) actuator allows for rapid, reliable deployment of the chemical suppressant.
- Integrated OSHA Lockout
- A variety of suppression agents, including Sodium Bicarbonate and Furex, are available to handle class St. 1 or St. 2 combustible dust or hybrid mixture hazards.



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INTERCEPTOR[®]VE™

Explosion Isolation System

The Interceptor[®]-VE™ is designed to prevent explosion propagation from one vessel to another through interconnected piping. It can also be used to prevent hot particles, glowing embers, or flames from reaching a vessel and igniting a deflagration or a fire.

The Interceptor[®]-VE™ Valve is normally open. Upon receiving a signal from either a pressure responder, explosion panel or an optical sensor the Interceptor[®]-VE™ Controller will respond by sending a signal to the Interceptor[®]-VE™ Valve. The Interceptor[®]-VE™ Valve will close in milliseconds to prevent passage of hot particles, glowing embers, flames, or pressure from continuing to flow through the pipe.

Advantages:

- Requires minimal maintenance
- Imparts negligible shock to the piping in which it is installed
- High reliability through cyclic activations
- Clam shell valve housing enables easy bladder replacement
- Creates a physical barrier that is withheld during the entire duration of primary and secondary explosions



INTERCEPTOR[®]FV™

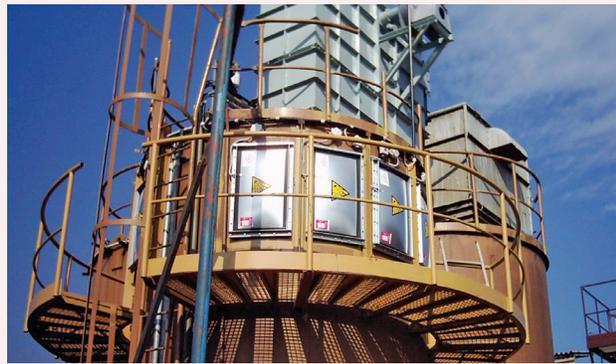
Explosion Isolation Flap Valve

During normal operating conditions, the Interceptor[®]-FV™ Explosion Isolation Flap Valve is mechanically retained in the open position. This results in a low pressure drop across the valve as compared to similar models on the market that rely on the process flow to open the valve. During an upset condition, the regular flow is interrupted and a flux of pressure coming from the opposite direction causes the Flap Valve to slam and lock shut, effectively preventing the dust deflagration from propagating to interconnected equipment.

Advantages:

- Ideal for clean air and low product to air ratio lines
- Position indicator to signal when an activation has been made
- Unique design that locks the valve closed during an upset condition to prevent flame and pressure breakthrough.
- Economic isolation solution
- Simple install
- Low maintenance and maintenance costs
- Requires no electrical energy or activation system





Represented By:



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