

# DUST COLLECTION SYSTEMS

**Typical  
Industries  
Served**Chemical  
Wood ProcessingPharmaceutical  
Food/AgriculturalPetrochemical  
Paint/Coatings

## INTRODUCTION:

Dust collection involves the removal, or collection, of solid particles from a flowing air stream, for the purpose of eliminating nuisance dust, the safety and health considerations of employees, product quality improvements, and the collection of powdered products.

There are several types of dust collection systems, which use numerous methods to separate the dust from the air stream.

Some examples are:

- Bag filters
- Cartridge filters
- Cyclone separators
- Electrostatic precipitators.



The purpose of this application guide is to provide an understanding of the possible explosion hazards, and protection strategies for dust collection systems. This document is intended to be a guideline and is not applicable to all situations. If you have any questions, please contact the Fike Explosion Protection Group, or our sales representative in your area.

## The Problem: Deflagration (Explosion)

Dust collectors are by far the leading type of equipment to experience explosions<sup>1</sup>. They typically process combustible material particulate that is suspended in air. Concentrations of the particulate (dust) in the collector chambers are usually above the lower explosibility limit. All that is needed, for an explosion to occur, is an ignition source. While electrostatic discharge is one possible source of ignition, sparks, flame, or smoldering embers are sometimes carried into the collector from upstream equipment.

## The Solution: Explosion Venting / Isolation / Suppression

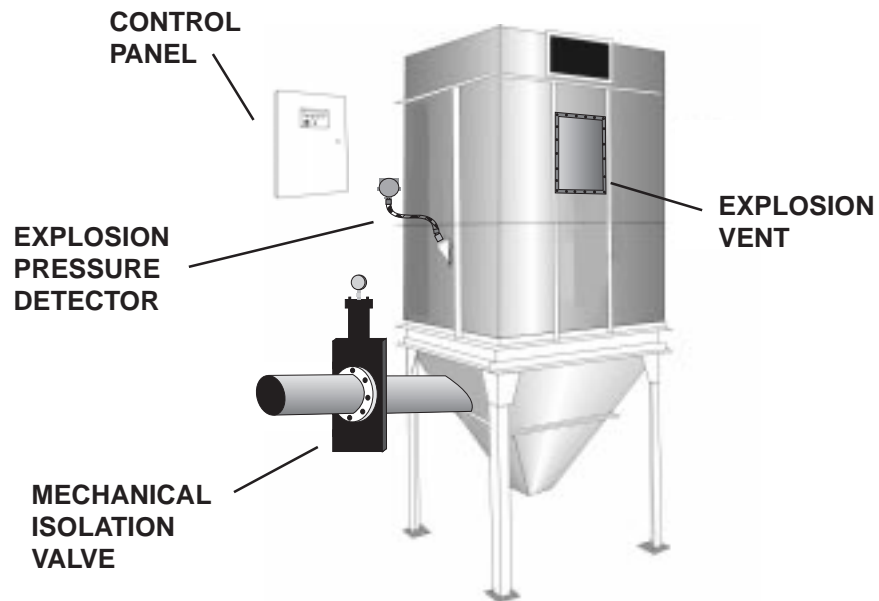
Preventative strategies, such as inerting or spark extinguishing systems, only reduce the frequency of explosions<sup>1</sup>. Fike's explosion protection solutions decrease the severity of the explosion to safe levels, and prevent catastrophic destruction.

EXPLOSION VENTING is most widely used for dust collectors located outdoors. Design and application guidelines are found in NFPA 68, 1998 edition, Chapter 7.

Features & Benefits:

- Fike vents have the **highest venting efficiency**, compared to other venting devices,
- **Certified burst pressures** ( $P_{stat}$ ) provide highest reliability,
- Full opening, **non-fragmenting** design prevents the need for restraints, or barriers,
- Passive protection, **no** moving parts eliminate routine **maintenance**,
- **Low cost** and long service life,
- **Design assistance** provided by Fike to determine size, configuration, and placement.(ref: application software)

### Explosion venting with mechanical isolation



EXPLOSION ISOLATION - NFPA 654, 1997 edition, Section 3-1.2.2, states that isolation devices shall be provided to prevent deflagration propagation from air material separators to work areas.

The Fike Explosion Isolation Valve System will prevent flame propagation from the dust collector to upstream areas. The fast acting valve closes within milliseconds of deflagration detection.

<sup>1</sup>Factory Mutual Data Sheets 7-76, September 1998

#### Features & Benefits:

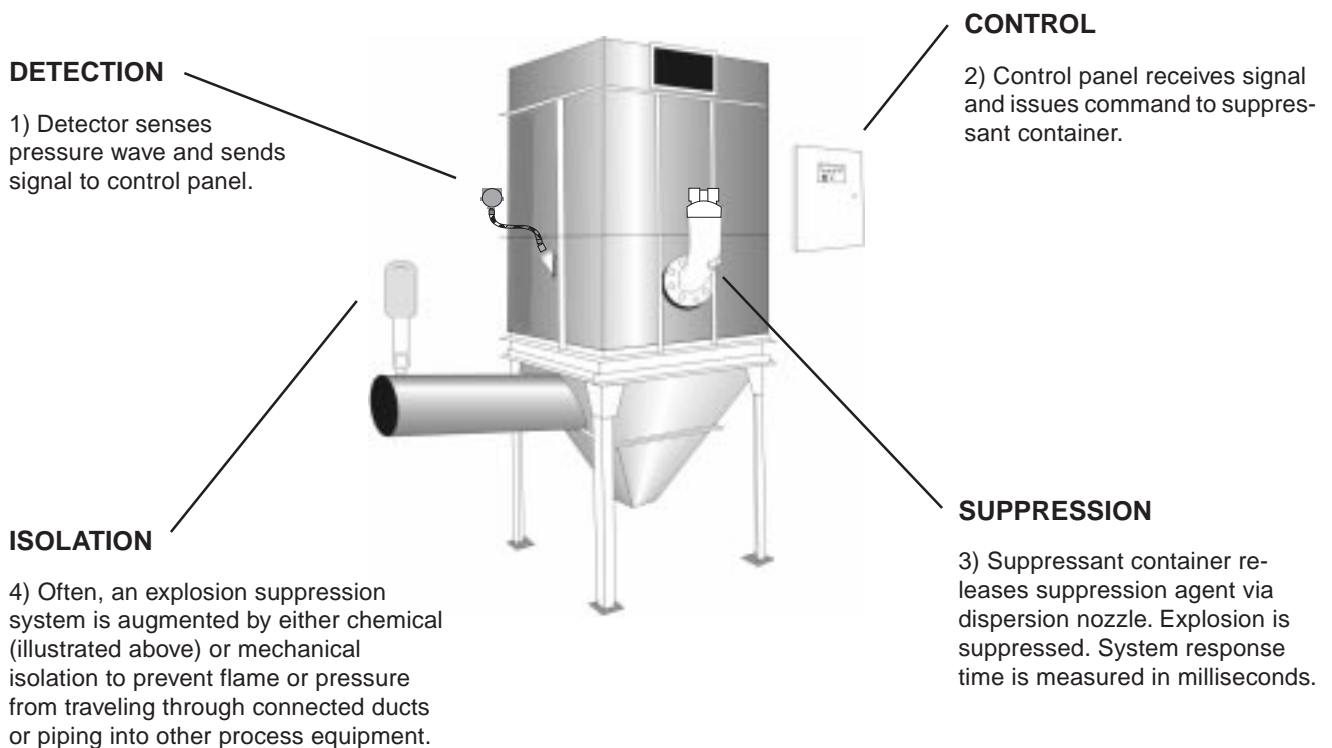
- **Minimal distance** required from the ignition point, usually less than 5 feet, allowing the valve to be located close to the dust collector,
- **Bi-directional design** can stop flame originating from either side of the valve, eliminating the need for two isolation devices,
- Full port valve opening provides **no pressure drop** across the valve,
- The valve can be **mounted on both horizontal and vertical piping** allowing more installation flexibility,
- New conduit valve design provides a clean valve seat to **prevent plugging** and product collection areas,
- Isolation valve can be **serviced without removal from the process line**, minimizing production downtime,
- New Gas Cartridge Actuator (**GCA**) **eliminates** the need for **explosive initiators** and nitrogen storage containers.

EXPLOSION SUPPRESSION is most widely used for dust collectors located indoors. Explosion Suppression provides additional protection benefits when compared to venting.

#### Features & Benefits:

- **Extinguishes the flame** within the dust collector, preventing fire damage,
- Chemical isolation **prevents pressure piling and secondary explosions** with interconnected equipment,
- **Compliance with NFPA regulation** barring the venting of explosions indoors. Explosion vents must be discharged to a safe location. Indoor applications are difficult to vent....even with discharge ducts,
- **Retains toxic or valuable** materials within the process equipment,
- **Integrates with the process controls** to enable other protection devices, process shutdown, and remote annunciation devices,
- **Uses gas cartridge actuators instead of explosive initiators.**

### Four steps of successful explosion protection



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# FIKE'S "TOTAL CONCEPT" APPROACH TO EXPLOSION PROTECTION

Fike's approach provides you with the protection options you need, based upon your specific process requirements, and your protection objectives. Leading the industry in technology, we are continuously pursuing optimization of our protection strategies, and developing new ones to meet our customer's needs. You can be sure of system reliability, compatibility, and effective explosion protection because Fike is the only "single-source" manufacturer in the world that can offer this comprehensive range of products and services.

**Explosion Testing** - A wide range of bench-scale, and industrial-scale tests to determine explosibility characteristics of process media, and to validate protection strategies

**Explosion Venting** – Relieves explosion overpressure conditions within process equipment, before destructive levels of pressure can be reached

**Explosion Isolation** – Mechanical or chemical barriers to prevent the spread of explosions through inter-connecting pipes or ducts

**Explosion Suppression** – Detects and extinguishes the explosion in its very early stages, before destructive levels of pressure can be reached

**Field Service & Customer Training** – Isolation and Suppression systems are active strategies that require periodic maintenance and inspection. Fike has the service capability to perform these functions for you, or a training option to qualify and certify your employees

**Engineering Workshops And Seminars** – An ongoing program to educate engineers, designers, and others in industry who are involved in, or concerned with industrial process safety.

## **Other Fike products and services of possible interest:**

**Rupture Disc** – A pressure relief device, typically applied to a closed chemical process, will open at a predetermined pressure and temperature to prevent the bursting or explosion of the process

**Fire Detection and Suppression Systems** – Automatic systems to detect and extinguish fires in controlled environments, or special hazard areas, such as control rooms, auxiliary power station, chemical storage, etc.

Typical agents used:

- CO<sub>2</sub>
- HFC-227ea
- Water Mist

Detailed information for all these solutions, and locations of our global sales and support organization, are available through our web site at [www.fike.com](http://www.fike.com). For your convenience you may call us directly at (816) 229-3405, or e-mail your requests to [fmppsales@fike.com](mailto:fmppsales@fike.com).



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