

DUST COLLECTION SYSTEMS

TYPICAL INDUSTRIES SERVED

- Chemical
- Wood Processing
- Pharmaceutical
- Food/Agriculture
- Petrochemical
- 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 precipitator

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 Fike Explosion Protection Technical Support, or the Fike representative in your area.

THE PROBLEM: DEFLAGRATION (EXPLOSION)

Dust collectors are the leading type of equipment to experience explosion. 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 limit. All that is needed for an explosion to occur is an ignition source. While electrostatic discharge is one possible source of ignition, parts, flame, or smoldering embers are sometimes carried into the collector from upstream equipment.

THE SOLUTION: EXPLOSION VENTING/ISOLATION/SUPPRESSION

Preventative strategies, such as inserting spark extinguishing systems, can reduce the frequency of explosions but do nothing to mitigate the destructive effects of explosions that do occur. Fike's explosion protection solutions decrease the severity of the explosion to safe levels, and prevent catastrophic destruction.



EXPLOSION VENTING

Explosion venting is most widely used for dust collectors located outdoors. Design and application guidelines are found in NFPA 68.

Features and 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 involving no moving parts eliminating routine maintenance.
- Low cost and long service life.
- Design assistance provided by Fike to determine size, configuration, and placement. (ref: application software)

EXPLOSION ISOLATION

NFPA 654, states that isolation devices shall be provided to prevent deflagration propagation from air material separators to work areas.

The Fike Explosion Isolation Valve (EIV) prevents flame propagation from the dust collector to upstream areas. The fast acting valve closes within milliseconds of deflagration detection.

Features and Benefits:

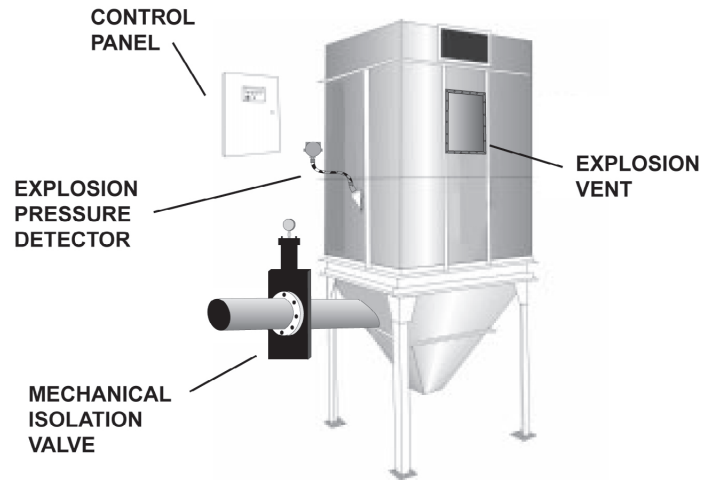
- Minimal distance required from the ignition point, usually less than 5 feet, allowing the valve to be located close to the dust collector.
- Bi-directional design can stop flame originating from either side of the valve, eliminating the need for two isolation devices.
- Full port valve opening provides 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.
- Gas Cartridge Actuator (GCA) eliminates the need for explosive initiators and nitrogen storage containers.

EXPLOSION SUPPRESSION

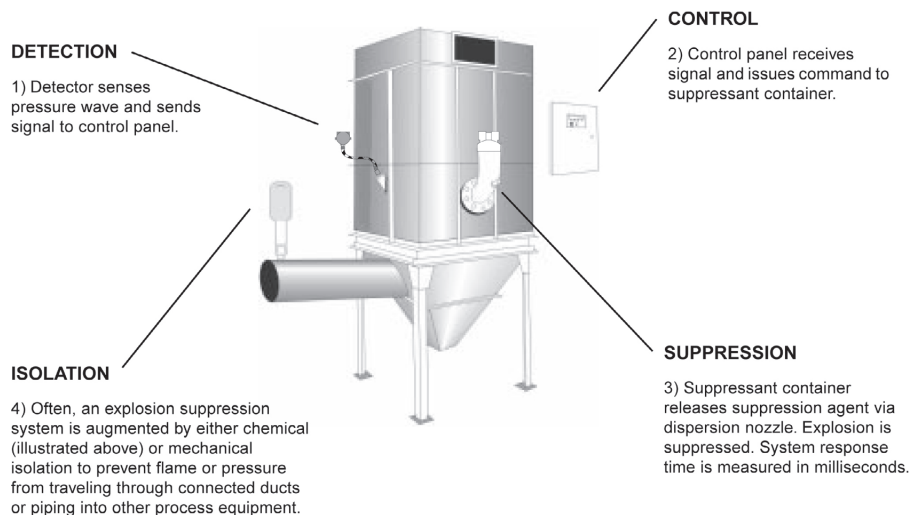
Explosion suppression is more widely used for dust collectors located indoors. Explosion Suppression provides additional protection benefits when compared to venting.

Features and Benefits:

- Extinguishes the flame within the dust collector, preventing fire damage.
- 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 GCA's instead of explosive initiators.
- The addition of chemical isolation prevents pressure piling and secondary explosions with interconnected equipment.



Explosion Venting with Mechanical Isolation



Four Steps of Successful Explosion Protection