



**EPACO™**

**APPLICATION PROFILE**

# MANUAL FILL HOPPER

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## INTRODUCTION

This process includes a hopper for manually feeding product into a powder handling plant, see figure on page 3. Filling of product hoppers can cause dust particles to become agitated and suspended in air. This dust laden atmosphere can then support a deflagration if an ignition is introduced. A dust collector is installed onto the hopper to pull vacuum, which in effect limits the amount of dust that will become airborne both inside and outside the hopper when feeding the product.

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## HAZARD

Sparks or static electricity are potential sources that can ignite an explosion within the dust laden atmosphere of the equipment. A possible spark source is tramp metal being introduced during hopper filling. An electrostatic discharge can also be created by the bag or scoop used during product filling, the dry air around the dust collector bags, or by personnel contact with the equipment.

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## SOLUTION

In this example, the hopper and personnel are protected by an explosion suppression system. Because it is a semi-open system, an explosion suppression system brings additional safety, whereas venting would allow the flame to run its full course.



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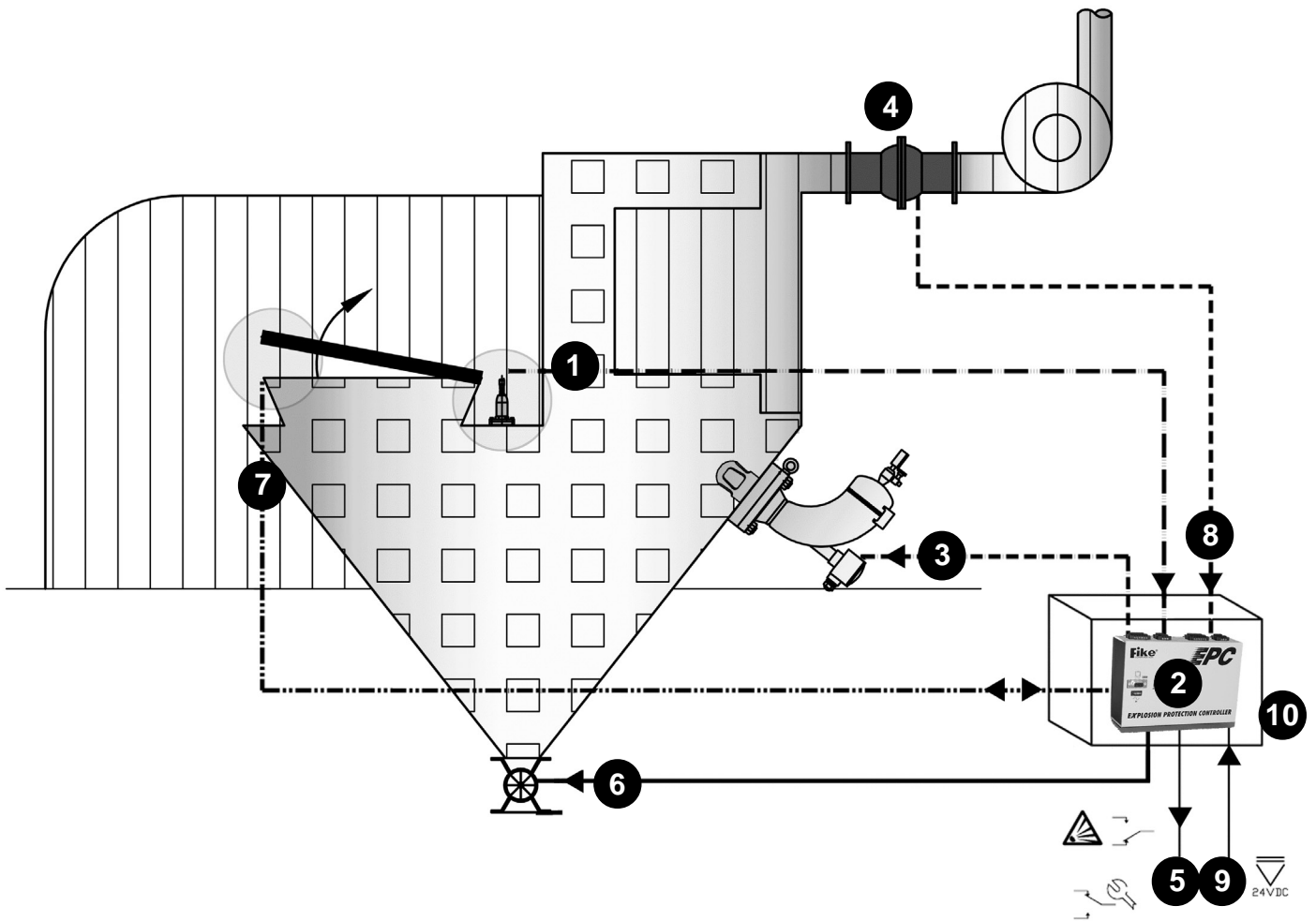
## OPERATION

A pressure detector (item 1) attached to the hopper will detect any explosion in its incipient stage, and will signal the suppression system's Explosion Protection Controller (EPC) (item 2). The control system will activate the suppression container (item 3) which injects suppressant powder to extinguish the explosion. This event will typically be completed within less than 100 msec and the pressure developed will be limited to 0.5 barg (7 psig).

The Isolation Barrier (item 4) installed in the air outlet will protect areas and equipment downstream, such as the fan, against the explosion effects. To prevent explosion propagation to downstream process areas, an explosion proof rotary valve (item 6) in the bottom outlet of the hopper is installed.

Further protection measures include:

- Relay contacts, in the EPC (item 5), that switchover in case of a detected explosion, or system trouble. They are used to stop the process or bring it into a safe state
- A contact installed onto the hopper hatch or door (item 7), to prevent access to the process in any unsafe state. For example, status information from the EPC can be used to inhibit access when the suppression system would be disarmed, or not ready to suppress a possible explosion



Item	Type of Device	Info	(Safety) Function
1	CEREx Explosion Detector	Input (A*)	Detects an explosion in its incipient stage
2	Explosion Protection Controller (EPC)	I/O	Monitoring, releasing, alarming
3	HRD Suppressor on Cyclone Wall	Output (D*)	Injects suppressant to extinguish Eeplosion
4	Explosion Barrier	Passive Device	Provides a mechanical block to stop explosion propagation
5	Relay Contacts (Trouble/Alarm)	SPDT	To stop the process, to signal status
6	Rotary Valve	Passive Device	Stops Explosion Propagation
7	Door Lock (Inhibit) Contact	I/O (D)	Interlock to improve personnel safety
8	Valve's Position Indicator	Info (D)	Signals valve status (open/closed)
9	Power Supply (from PSU)	24 VDC	Provides power to the EPC
10	EPC Enclosure	Rated for Area	EPC housing suitable for "Ex" Area

(A\*): analog information, for example 4 - 20 mA signal

(D\*): digital information, for example high/low or open/close

I/O: input and output

SPDT: single pole, double throw

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## **Fike Corporation**

Fike Corporation has an extensive product offering for facility and process protection for commercial and industrial applications.

**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.

**Explosion Venting/Isolation/Suppression** - Total Concept Explosion Protection, including explosion testing, explosion venting, flameless explosion venting, explosion isolation, and explosion suppression systems to mitigate the effects of industrial explosions.

**Fire Detection Systems** – Fike offers a full line of detection products from single hazard to multi zone analog addressable systems. These controls are suited for fire alarm, agent suppression systems, or sprinkler/pre-action fire detection and control systems. The Cheetah analog addressable control panel can be configured to communicate directly with one or more VESDA® LaserPLUS detectors via a High Level Interface (HLI).

**Fire Suppression Systems** – Fike offers a full range of suppression systems to protect your equipment and/or process. Because Fike offers more than one choice of extinguishing agents you are certain to get the right agent for your hazard. Fike systems incorporate the following agents:

- HFC-227ea
- Carbon Dioxide
- Water Mist
- ECARO-25

### **Fike global manufacturing, sales and service**

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