MANUAL FILL HOPPER

Application Profile

INTRODUCTION

This process includes a hopper for manually feeding product into a powder handling plant (see figure on page 2). 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.

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.

SOLUTION

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

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 switch over 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

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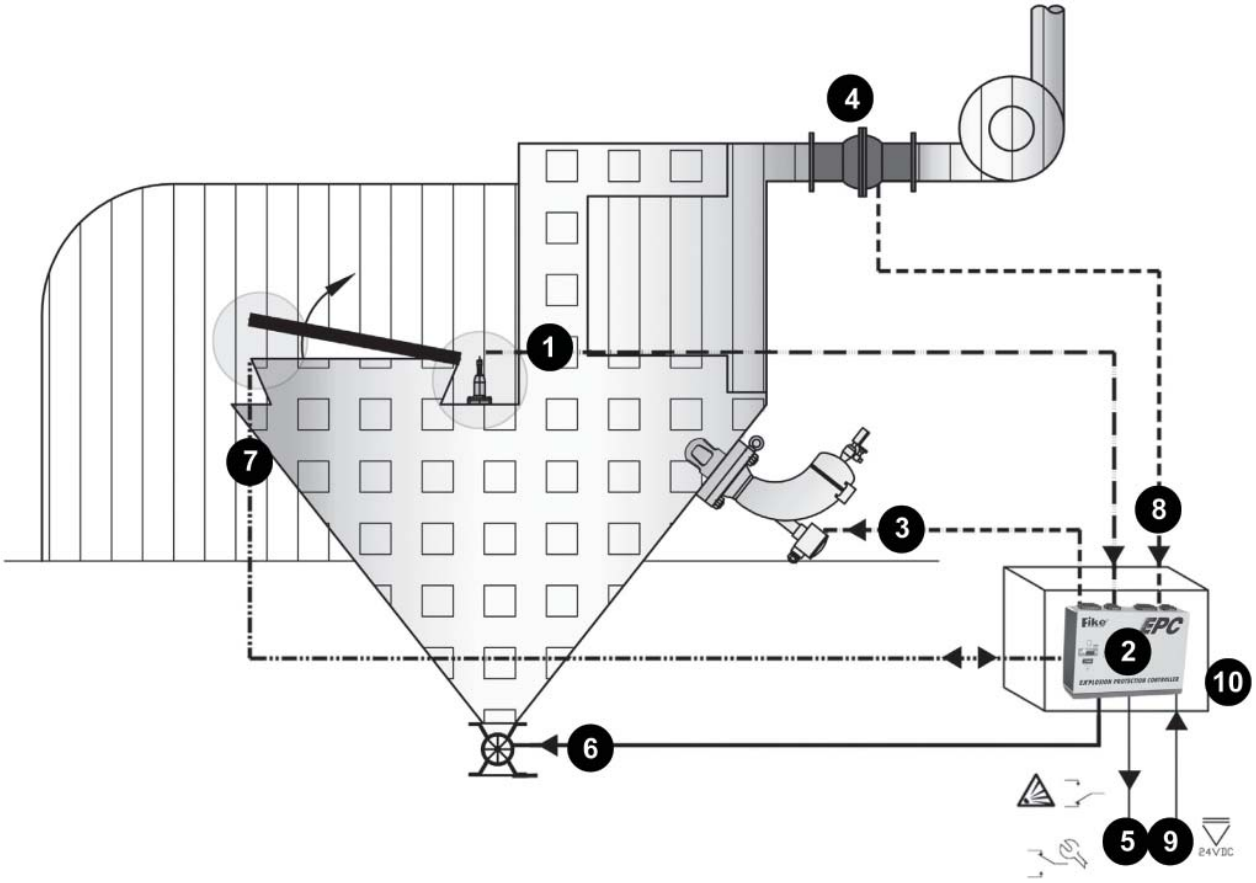
Item	Type of Device	Information	(Safety) Function
1	Integra® Explosion Detector	Input (A*)	Detects an explosion in its incipient stage
2	Explosion Protection Controller (EPC)	I/O	Monitoring, releasing, alarming
3	HRD Suppressor on Cyclone Wall	Ouput (D*)	Injects suppressant to extinguish explosion
4	Explosion Barrier/Ventex	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



Form No. EAP 1019 April, 2005 Specifications are subject to change without notice.