TABLETS & CAPSULES
Solid Dose Digest
Insights, advice, and industry news about formulating, manufacturing, and packaging solid dosage forms brought to you by Tablets & Capsules *magazine*

September 24, 2018

Ask an Expert

Explosion protection options

Q: What explosion protection options can I use to protect my dust collection system?

A: David Steil, Camfil Air Pollution Control (APC) says:

An unprotected dust collection system can be a main source of combustible dust explosions, and an explosion inside a dust collector can produce a high-pressure wave that can fragment the housing and send heat, flames, and dangerous projectiles into the workspace. This can injure personnel and damage equipment and structures. Therefore, it's imperative to have an effective, NFPA-compliant, explosion protection system for your dust collector.

Two main types of protective systems are available: active and passive.

Active systems
Active systems react prior to or during a deflagration event and include chemical suppression and isolation and fast-acting valves.

Chemical isolation. Chemical isolation systems react within milliseconds of detecting an explosion. Typical components include an explosion pressure detector, suppressant canisters, and a control panel. The system creates a chemical barrier that suppresses the explosion within the inlet and/or outlet ducting, reducing or eliminating the spread of flame. It also minimizes the pressure increase within the connected process equipment.

Chemical suppression. While chemical isolation protects the ducting, chemical suppression protects the dust collector itself. The system detects an explosion hazard within milliseconds and releases a chemical agent to extinguish the flame before an explosion can occur. You can use chemical suppression with isolation when you have located the collector within a good manufacturing practice (GMP) space, when the collector handles hazardous dust that you can't release directly into the atmosphere, or when you have located it in a mechanical area where the system has no direct access to an outside wall or ceiling location through which the explosion vent ducting can protrude.

Fast-acting isolation valves. Fast-acting isolation valves close within milliseconds of detecting an explosion. They create a physical barrier within the inlet and/or outlet ducting that effectively isolates pressure and flame fronts from either direction, preventing them from spreading through the ducting to the process equipment.

Passive systems
These systems react immediately following an event to prevent the deflagration from traveling to other areas and causing more damage. Most manufacturers use passive systems because they are less costly than active systems and don't require periodic recertification.

All passive systems control the speed of explosions by releasing the pressure produced when it has reached a certain limit. Passive systems include explosion venting, flameless venting, explosion isolation dampers, and integrated safety monitoring filters.

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Explosion venting. Explosion venting is the most commonly used passive system for dust collector housings (photo). When dust inside a collector combusts, the pressure inside the collector can reach unsafe levels. This feature safely vents the gases and pressure from a deflagration to minimize or eliminate damage and injury to workers in the area. The explosion vent opens when the pressure reaches a specified level that is lower than the dust collector's designed pressure, allowing the pressure and flame front to exit to a safe area. NFPA 68 Standard on Explosion Protection by Deflagration Venting sets the criteria for the design, location, installation, maintenance, and use of these systems.

Flameless vents. Installed over a standard explosion vent, flameless vents extinguish the flame front as it exits the collector (photo). This enables you to install the venting indoors, depending on the application. You need to

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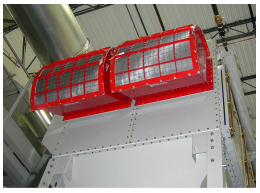
establish a safe area around the flameless vent, as the manufacturer specifies, because the vent still releases pressure.



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Explosion isolation dampers. Isolation dampers provide an additional layer of protection. You install them in the inlet ducting to create a mechanical barrier that keeps explosion flame and pressure from traveling through ducts into the process area. Normal airflow keeps the flap plate open. If an explosion occurs, the pressure wave forces the flap closed, containing any flames and pressure.

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Integrated Safety Monitoring Filters (iSMF). iSMFs are an outlet protection device because they protect the downstream (outlet) equipment and work areas (photo). Installed on the top of the dust collector, the iSMF acts as a flame front barrier. In the event of a dust collector explosion, the filter prevents the flame front from exiting the collector and entering the workspace. If properly tested and documented, the iSMF is an effective flame front arrestor for ST1 and ST2 dusts, according to performance-based design options provided in Chapter 5 of NFPA 654 and NFPA 69.

David Steil is pharmaceutical market manager at Camfil Air Pollution Control (APC). Camfil APC is a leading manufacturer of dust collection equipment. For information, contact the company.

***Do you have a question for our experts?** Send your questions to pwright@cscpub.com, and we'll have an expert answer them.*

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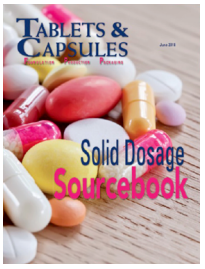

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