Coffee Break Training - Fire Protection Series

Hazardous Materials: Dust Collection Explosion Vents

No. FP-2011-14 April 5, 2011

Learning Objective: *The student shall be able to identify explosion vent devices for dust collection systems.*

These large metal structures are cyclone dust collectors installed at an industrial cabinetmaking facility. They are connected to a dust collection system that is designed to remove suspended combustible particulates in the factory.

When organic materials—in this case wood dust—are mixed with air, there is a chance the mixture will ignite in a deflagration creating an explosive pressure increase in the duct system. To reduce the damages that could be caused by explosion, dust collectors are provided with exhausts or vents that allow the explosion to go out of the system before causing additional further damage. In today's illustration, the square devices mounted on the cyclones are panels that release in the event of a pressure increase.

The square devices on these cyclone collectors are explosion vents to relieve deflagration pressure in the dust collection system.

National Fire Protection Association (NFPA) 68, *Standard on Explosion Protection by Deflagration Venting*, provides the following guidance on explosion protection.

- The vent design must be sufficient to prevent deflagration pressure inside the dust collector from exceeding two-thirds of the ultimate strength of the weakest part of the dust collector, which must not fail.
- Dust vent explosion operation must not be affected by snow, ice, sticky materials, or similar interferences.
- Dust explosion vent closures should not become projectiles as a result of their operation. The closure should be properly restrained without affecting its function.
- Explosion vent closures must release at overpressures close to their design release pressures. Magnetic or spring-loaded closures will satisfy this criterion when properly designed.
- Explosion vent closures must reliably withstand fluctuating pressure differentials that are below the design release pressure.
- Dust explosion vent closures must be inspected and properly maintained by qualified personnel in order to ensure dependable operation. In some cases, this may mean replacing the vent closure periodically.
- The supporting structure for the dust collector must be strong enough to withstand any reaction forces developed as a result of operation of the dust explosion vent.
- Industrial exhaust system ductwork connected to the dust collector may also require explosion venting.

For additional information, refer to NFPA 68.