

The Facts About Dust Collector Explosions

By Dave Grandaw, IEP Technologies

Powder & Bulk Solids magazine just confirmed what we in the explosion protection profession have known forever. Namely, dust collectors are the most explosion-prone type of equipment in the process industry. From 2008 through 2017, explosions in dust collectors have accounted for 91 explosions in the United States alone, leaving 15 workers dead and another 101 injured. This tragic toll does not include the high cost to companies in terms of business interruption, equipment replacement and increased insurance costs.

This is not a new trend. So why do the explosions continue to occur?

Dangerous Conditions. Every dust collector contains all the elements a devastating explosion requires. These conditions include fuel in the form of finely-divided combustible dust; an oxidizing agent, which is typically the oxygen in the air; an ignition source which can range from static discharge to a burning ember from an upstream source; confinement that causes a pressure buildup; and dispersion of the dust into the airstream. Dust collectors handle the finest size particles in the facility. The finer the dust particle for a given material, the easier it is to ignite and the more energetic it burns. This makes dust collectors among the most dangerous vessels in the plant. In addition, a single dust collector often services multiple process areas. An uncontrolled explosion propagating from the dust collector back upstream can expose more than one area of the plant to flame ejection or a secondary explosion.

Inadequate Housekeeping. In addition to the dust inherent in a dust collector, many plants allow a buildup of dust and debris over a period of time. This enables an explosion to grow in size and intensity both inside and outside the dust collector.

The Absence of Explosion Prevention or Protection. Too many companies are willing to take risks when dealing with the possibility of dust collector explosions. The “it can’t happen here” theory often leads to the elimination of such safety measures as spark detection technology; proper grounding and bonding; venting, isolation and suppression solutions; and continuous safety training of plant personnel. All of these actions are critical to preventing an explosion under normal operating conditions.

-More-

The Good News. NFPA 68 – Standard on Explosion Protection by Deflagration Venting – addresses the most basic, economical and widely used explosion protection method for dust collectors. Explosion relief venting requires an explosion relief vent be installed on the wall of the dust collector. The vent features a membrane constructed of a material weaker than the vessel wall. In the event of a dust explosion, the vent ruptures and directs the explosion’s overpressure, flame, burnt and unburnt materials and other combustion by-products to a safe location. NFPA provides an equation for estimating the vented fireball’s size so that the designer can calculate the safe distance required in front of the vented vessel to protect workers, equipment and the building structure from the ejecting fireball.

We offer a complete variety of state-of-the-art venting options so there’s no reason your dust collector should join those from highly publicized companies who have suffered an explosion event. We also provide material testing services, static detection systems, both rupture-style and flameless venting, isolation and suppression solutions and global service.