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# Is Your Vacuum Explosion-Proof?

**By Paul Miller**

Fourteen employees were killed and 40 injured when finely ground motes of dust ignited and set off a violent blast at a sugar plant near Savannah, GA, in February of 2008. In addition to the fatalities and a tarnished reputation, the U.S. Department of Labor's Occupational Safety and Health Administration (OSHA) has fined the company more than US$8 million in workplace violations related to combustible dust.

Although it took this fatal accident to make combustible dust a national headline, industrial facilities have been aware of the risk for years. The U.S. Chemical and Safety Hazard Investigation Board estimates there are an average of 10 explosions, five fatalities, and 29 injuries per year as a result of combustible dust-related incidents, but these numbers are most likely underestimates since less dramatic incidents, such as small fires and blasts without injuries, happen daily and often go unreported.

So what can be done to prevent these types of accidents? In March 2008, OSHA reissued its National Emphasis Program (NEP) on combustible dust to call attention to the agency's rigorous expectations for combustible-dust-related explosion prevention, which includes random unannounced audits. The program also outlines recommendations for decreasing plants' risk of an explosion, which includes incorporating an industrial vacuum into maintenance plans as a means to eliminate the dust that settles on overhead pipes, walls, floors, and machinery of industrial facilities.

Purchasing an industrial vacuum to combat combustible dust sounds easy enough, but there is some complexity to the investment, especially if the vacuum will be used to collect dust created from classified hazardous materials like coal, fuel, or even sugar, since using just a basic vacuum made of metal parts and exposed motors can actually add to the risk of explosion. For vacuuming up in these circumstances, a certified "explosion-proof" (EXP) vacuum is imperative. Below are some tips to buying a safe, effective EXP vacuum.

## Don't Fall for a Faker

In an EXP vacuum, everything from the outer shell to the internal mechanics, including the motor, switches, filters, and inner chambers, are grounded and constructed of nonsparking materials like stainless steel. Some vacuum companies offer basic industrial models dressed up with a few anti-static accessories and describe them as suitable for explosive material. These imposters can still create arcs, sparks, or heat that can cause ignition of the exterior atmosphere and overheating that can ignite dust blanketing the vacuum.

Purchasing an EXP vacuum approved by a nationally recognized testing agency, such as the Canadian Safety Association or Underwriters Laboratories, can protect buyers by providing legal certification that the vacuum can be used in a National Fire Protection Agency (NFPA)-classified environment. It ensures every component in the vacuum meets strict standards for preventing shock and fire hazards.

## EXP Vs. Intrinsically Safe

In environments where electricity is unavailable or undesirable, air-operated vacuums for hazardous locations are excellent alternatives. It is important to note that only electric vacuums can be certified and deemed EXP, but properly outfitted pneumatic vacuums, referred to as "intrinsically safe," can pack the same punch as their electric counterparts while still meeting the requirements for use in NFPA-classified environments. Plant managers should beware of vacuum companies that refer to their pneumatic models as "certified EXP." EXP certification for air-operated machines simply does not exist.

## Filtration

Superior filtration does not—and should not—have to be sacrificed on an EXP model, especially when collecting potentially hazardous materials. For peak safety and operating efficiency, an EXP vacuum should have a multi-stage, graduated-filtration system, which uses a series of progressively finer anti-static filters to trap and retain particles as they move through the vacuum. To eliminate combustible dust from being exhausted back into the ambient air, a HEPA or ultra-low particulate-air (ULPA) filter can be positioned after the motor to filter the exhaust stream. Quality HEPA filters offer an efficient, effective way to trap and retain the smallest dust particles, down to and including 0.3 microns. An ULPA filter captures even smaller particles, down to and including 0.12 microns.

## Spill Response

Spill response, or the ability to safely and easily collect liquid spills, should also be taken into account. While spills could be anything from harmless water to such dangerous substances as mercury or acid, a vacuum specifically equipped to collect liquids makes cleanup much easier and safer, especially compared with mopping. Although OSHA's NEP is specifically looking at companies that handle dry solids, manufacturers' maintenance plans are also under the microscope. If workers need to collect flammable or explosive chemicals, an EXP vacuum capable of collecting liquids should be considered. These wet-model vacuums are available in both electric and air-operated versions.

## Conclusion

On April 29, 2009, OSHA announced that they are initiating a comprehensive rulemaking on combustible dust. In the coming months, the agency will issue an Advanced Notice of Proposed Rulemaking and convene related stakeholder meetings to evaluate possible regulatory methods and request data and comments on issues related to combustible dust such as hazard recognition, assessment, communication, defining combustible dust, and other concerns. The use of industrial vacuums—specifically EXP models—as a preventative method will most likely be a part of those discussions and ultimately appear in the final OSHA standard.

Purchasing a high-quality, certified EXP or intrinsically safe vacuum is a solid first step in preventing a combustible-dust related explosion, and picking the right vacuum often raises a lot of questions, especially when it comes to disaster prevention. Like all investments, pre-sale research is key. Plant managers shouldn't hesitate to ask the vacuum manufacturer for an on-site analysis of their vacuum needs to recommend the type of vacuum, hose, and accessories needed for the application. With the right equipment, the vacuum can be used to collect dust and debris from the floor, machinery, walls, and even overhead pipes and vents. While every manufacturer will be responsive to your needs before you buy, look for a company that will still be there after the bill is paid. Excellent post-sale support and training will make things easier when it's time to purchase replacement parts and filters or service the vacuum.

If used consistently and in conjunction with a comprehensive maintenance plan, your facility's investment in an EXP vacuum will result in much more than just a clean plant. It will save money, protect company integrity, increase productivity, and most importantly, protect your most valuable asset: your employees.

Paul Miller is vice president and general manager of Nilfisk CFM.