Tips for Creating a Dust Management Strategy

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Conduct an industrial hygiene assessment to develop air quality measures based on relevant regulations and guidelines.

Dust collection systems are necessary for powder and bulk solid manufacturing and processing facilities because airborne particles can cause health and safety issues, contaminate products, and damage equipment. But industrial dust collectors alone are not a total solution. Rather, they should be part of an overall dust management strategy. Here are several important considerations when creating a dust control program for your facility.

Conduct an Industrial Hygiene Assessment

OSHA's General Duty Clause, Section 5(a)(1), stipulates that employers are responsible for identifying and abating hazards in the workplace. To help employers recognize potential risks, OSHA provides guidelines on hazard identification and assessment.

A dust management program should include conducting an industrial hygiene assessment of your facility to help you develop air quality measures based on regulations and guidelines specific to your operation. Your dust collection system must enable your facility to meet OSHA's permissible exposure limits (PELs) for the dusts produced by your processes. OSHA established these PELs based on an eight-hour time-weighted average (TWA) for hundreds of dusts—ranging from nonspecific or nuisance dust to highly toxic substances. They are listed in OSHA's annotated PELs tables.

Image: Conduct an industrial hygiene assessment to develop air quality measures based on relevant regulations and guidelines.

Note that OSHA's PEL requirements determine the minimum level of filtration efficiency your dust collector must achieve. If you are achieving these minimum levels, but your employees are reporting dust-related health or housekeeping issues, you will have to adjust your system to reach the highest level of safety for your facility.

Obtain a written guarantee from your dust collector supplier stating the maximum emissions rate for the equipment over an eight-hour TWA. Because OSHA regulations require the quantified amount of dust in the air to be below the PEL, filter efficiency stated as a percentage is not an acceptable substitute, even if the supplier promises 99.9 percent efficiency.

If you are exhausting the air outdoors, you are subject to EPA National Emission Standard for Hazardous Air Pollutants (NESHAP) Rule 6x. If you opt to exhaust the air straight outdoors, you must perform an EPA Method 22 Fugitive Emission test per NESHAP Rule 6x. The test is conducted using a visual determination of fugitive emissions from exhaust sources and performed by a trained observer.

Another important resource to help you reach your clean air requirements are the guidelines found in Industrial Ventilation: A Manual of Recommended Practice for Design from the Association Advancing Occupational and Environmental Health (ACGIH). Also ask your authority having jurisdiction (AHJ), such as Factory Mutual or local fire marshals, for their safety guidelines.

Part of your industrial hygiene assessment should include talking with your workers. They can let you know if current engineering controls are effectively managing dust at the facility and suggest areas for improvement in processes and equipment.

Your dust collection equipment supplier can recommend an industrial hygienist or environmental engineering company experienced in identifying dust specific to powder and dry bulk operations.

Address Combustible Dust Issues
The National Fire Protection Association (NFPA) has two standards relevant to powder bulk and solid processing that require a combustible dust hazard analysis (DHA) to assess risk and determine the necessary fire and explosion protection. These standards are 652 on the fundamentals of combustible dust and 654 for the prevention of fire and dust explosions from the manufacturing, processing and handling of combustible particulate solids.

Image: The NFPA has two standards relevant to combustible dust generated from powder bulk and solid processing.

OSHA requires employers to have records identifying the dust generated in your application. Facilities producing combustible dust during their processes must complete a DHA by the fall of 2020 and demonstrate reasonable progress toward completion of the DHA in each of the years approaching the deadline.

The first step in a hazard analysis is determining whether your dust is explosive. The results found in your dust explosivity testing should include the Kst and Pmax, which indicate the amount of pressure an explosion can generate and how fast it can travel. Kst is the normalized maximum rate of explosion pressure rise, measured in bar m/s. A bar is a metric unit of pressure, which is slightly less than the average atmospheric pressure on earth at sea level. Your dust collection equipment supplier will need the Kst and Pmax values at a minimum to correctly size explosion venting or suppression systems.

If your facility produces or processes combustible dusts, your collector must be equipped with deflagration protection, such as explosion venting. The NFPA 68 standard on explosion protection by deflagration venting provides stringent and mandatory requirements for dust collection applications involving explosive dusts. NFPA 68 focuses on explosion venting of combustion gases and pressures resulting from a deflagration within an enclosure or dust collector. The safety objective of NFPA 68 is to prevent structural failure of the enclosure and minimize injury to personnel in adjacent areas outside of the enclosure.

Prioritize Dust by Hazard and Quantity
In addition to conducting an industrial hygiene assessment and explosibility testing, it is important to analyze other dust characteristics to determine the best dust collection system and filters for your operation. Key dust properties include particle size, dust shape, gravity, moisture level and abrasiveness. Understanding these components leads to the optimal selection and design of your dust control system. Dust collection equipment suppliers often can conduct dust sample bench testing and work with you to specify the best system for your application. To create a complete picture of your operation, the testing laboratory should ask for detailed application data.

Optimize for Safety
As part of your dust management plan, evaluate your need to include additional dust collector safety features. For example:

* Make sure the collector is service friendly with filter cartridges positioned for ease of access that readily slide in and out of the housing.

Image: Ease of access to filter cartridges is an important dust collector safety feature.

* Lockout/tagout doors prevent injury or exposure caused by inadvertently opening doors during a pulse cleaning cycle.

* Optimize fire and explosion protection with flame-retardant filter media, spark arrestors and sprinkler systems.

* Equip the collector with a high-efficiency safety monitoring filter. This secondary filter prevents collected dust from re-entering the workspace if there is a leak in the collector’s primary filtering system.

* Where highly toxic dust is being handled, a bag-in/bag-out (BIBO) containment system might be required to isolate workers from used filters during changeout.

Image: A bag-in/bag-out containment system is often required when handling toxic dust.

* OSHA-compliant railed safety platforms and caged ladders can prevent slips and falls when workers access the dust collector for service.

Conclusion
Managing dust in powder and dry bulk processing and manufacturing is necessary for the safety and well-being of employees and to

achieve regulatory compliance. Conducting an industrial hygiene assessment, assessing combustible and hazardous dust and evaluating your need for additional safety features will help you to develop your dust management strategy.

When selecting an air pollution control supplier, look for one that is experienced in your specific powder or dry bulk processes, is knowledgeable about OSHA, NFPA and EPA requirements, and has the technical resources to develop an engineered solution. The supplier should also offer a full range of equipment in order to give unbiased advice on the right type of system for your facility.

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