Stay safe from combustible dust and worst-case scenarios

Let's deep dive into how to comply with combustibles and requirements, de-bunk some of the myths, and keep it all on a need-to-know basis. Dig in!

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Bust combustibles

5 steps to comply with combustible dust requirements

Combustible dust causes numerous fires, explosions, and health issues not to mention property damage, injuries, and cost of life. Unfortunately, the number of incidents is only going one way – up! So, the threat from the hazards of combustible dust is real and we call upon all manufacturers across all industries to act accordingly.

Follow these five steps to comply with combustible dust requirements and reduce the risk of dangerous incidents.

1. Get your dust tested

Around the world, each industry has different requirements, though they all agree on one: Get your dust tested! A test will identify the kind of dust your facility handles or generates, and assess the risk of dangerous incidents. Only when you fully understand the nature of your dust you can set the proper cleaning procedures and select the best equipment to keep you and your facility from harm. Please note that not only is this test required, but it's also your responsibility to make it happen.

Do the test with a public or a private lab to rate your dust for combustibility and classification. The tests are very detailed and should evaluate five main factors:

1. Dust Cloud Explosibility Parameters (Kst, Pmax)
— Together, these parameters quantify the severity of a dust explosion, how much pressure it will generate, and how fast it will travel - even if there's no history of incidents with that dust.

2. Dust Cloud Ignition Limits (LOC, MEC)
— These two parameters predict the probability that a dust cloud will explode based on the concentration of oxygen and dust.

3. Minimum Auto-Ignition Temperature (MAIT)
— This is the lowest temperature at which a dust cloud will auto-ignite when exposed to hot air.

4. Minimum Ignition Energy (MIE)
— This test determines the smallest amount of ignition energy required to ignite a dust cloud.

5. Dust Layer Minimum Ignition Temperature (MIT)
— This is the minimum temperature required to ignite a dust layer on a hot surface. For many companies, dust testing is new and therefore creates a lot of questions. Look for a qualified testing lab with not only the expertise to test the dust, but to analyze and explain the results as well. Also, you will need this lab partner to provide the required compliance documentation.

2. Complete a dust hazard analysis

Okay, now your dust's tested. The next step is a dust hazard analysis. If the test shows no combustibles and the results back it up, you just proceed as normal. But if your dust's combustible, you'll need to complete a dust hazard analysis, a complete review of your facility and your progress. Also, the analysis will identify risks and outline plans to prevent, remove, and mitigate those risks.

All locations in your facility should be rated into three categories:

A. Not a hazard
B. Maybe a hazard
C. Deflagration hazard

A full dust hazard analysis should include a review of cleaning and maintenance procedures, the dust collection system, and the process machinery that produces dust. This will help you prioritize the management of hazards, offer the right employee training on combustible dust hazards, and create both safe and proper procedures for cleaning and manufacturing operations.

Your analysis should also provide all the information you need to develop clear, thorough training programs for employees.

3. Implement an efficient housekeeping process

Obvious? Well, nevertheless effective! The right housekeeping is one of the most effective steps to control combustible dust. Keeping dust from accumulating in the first place and preventing a secondary explosion hazard before it even starts. Once your analysis is complete, use it as a guide to outline the safest cleaning procedures for each area based on the specific risks. Also, proper and well-documented housekeeping procedures will help to ensure compliance with any local regulations and guidelines and to prevent penalties and fines.

Recommended (but not limited to) housekeeping procedures

• Clean dust residues at regular intervals

• Use cleaning methods that do not generate dust clouds if ignition sources are present (such as compressed air blow-down procedures)

• Use only industrial vacuum cleaners approved for dust collection

• Regularly clean floors and horizontal surfaces, such as ducts, pipes, hoods, ledges, and beams, to minimize dust accumulations within operating areas of the facility

• Keep dust accumulation to less than 1/32 inch thick (the thickness of a paper clip!)

• Electrically powered cleaning devices used in dusty areas, like sweepers or vacuum cleaners, must be approved for the hazard classification

4. Select the right equipment

Your national authorities don't just recommend how you should clean. Also, they dictate what kind of vacuum to use! Always make sure your vacuum comes from a certified and nationally recognized testing laboratory. Look for the following specifications for vacuums used to collect combustible dust

• Non-combustible construction, except for the filter, and meets requirements for construction and static electrical hazard controls

• Conductive or static-dissipative hoses including both suction and air delivery hoses

• All conductive accessories, including wands and attachments, must be bonded and grounded

• Dusty air is not to pass through the fan or blower

• Electrical motors must not be in the dust-laden air stream unless listed for Class II, Division 1 locations

• No paper filter elements for liquid or wet collection

• Metal dust vacuums must be listed for Class II, Division 1, Group E environments and meet other requirements for metals Beware of imposters that claim to be explosion-proof but are not certified. Your best choice to keep your facility safe is to select a certified explosion-proof vacuum. The certification information will be stamped on the vacuum's nameplate. And remember—if your manufacturing environment is certified, your choice is clear. You MUST select a vacuum certified for that environment

5. Get a site assessment

Get a site assessment. It's as simple as that. It'll save you both time and money to get someone to help you make the right decisions.

A thorough site assessment conducted by a vacuum specialist will help you identify hazards in your manufacturing facility and also help you select the right available equipment to help mitigate the risks. It will even help you safely through all the different standards and regulations (and there are quite a few to juggle!). Some vacuum suppliers offer site assessment as a part of their sales process, and this is an offer you can't refuse.

An effective site assessment includes

• A brief walk-through of your facility to identify where various cleaning methods or equipment could help you prevent safety hazards and remain in compliance with regulatory standards

• Identification of hazards and areas of noncompliance you might not be aware of

• A series of questions to thoroughly understand your cleaning challenges

• Equipment recommendations tailored to your applications

• Product demos and an opportunity for your staff to "test-drive" the equipment Each of these steps provides specific benefits that ensure the equipment you purchase will meet your needs

De-bunk the myths

Myth or truth? Can you call it? Test yourself

#1 Flour and sugar can't produce combustible dust

Myth! Sugar and flour are both on the list of combustible dust in the food manufacturing industry along with e.g. powdered milk, starch, cocoa, and cellulose. Also, did you know that grain processing facilities are especially exposed to dust explosion hazards because of their large amounts of dry airborne dust?

#2 Dust explosion hazards are obvious

Myth! Combustible dust is almost invisible to the human eye. It's measured in microns - one micron is 0.0001 centimeters or 1/25,000 of an inch. In comparison, a human hair strand is around 50-75 microns. So, make sure to both have a dust analysis and conduct proper housekeeping processes to keep you all and your facility from harm.

#3 Dust explosions in manufacturing facilities can be caused by poor housekeeping processes, dust backup in the dust collector's hopper, dust accumulated on horizontally mounted filters, and the discharge of static electricity.

Truth. All of the above can cause a dust explosion and actually, there are numerous other conditions to consider when working with combustibles. Make sure to train your employees in e.g. proper housekeeping processes.

#4 Wet scrubbers are always the most efficient choice to capture combustible dust and reduce the risk of fire and explosions due to the use of water.

Myth! Wet scrubbers can eliminate the need for costly ancillary explosion protection equipment but dry media dust such as dust collectors often offer higher efficiency removal of e.g. fine dust and large airflow capacities. A hazard analysis of your facility will identify your specific combustible dust application.

#5 'Explosion-proof' is a word invented by marketing people and a term that any manufacturer can use.

Myth! To have the privilege of using this term vacuums and other equipment must meet certain requirements. Make sure your equipment is tested and certified. Moreover, explosion-proof certification is not available for pneumatic equipment.

The nature of an explosion

Did you know that the energy from ignited dust can cause a pressure wave that travels through the air at terrifying speeds of up to 1,000 miles per hour? But let's just rewind a bit and see what can cause an explosion.

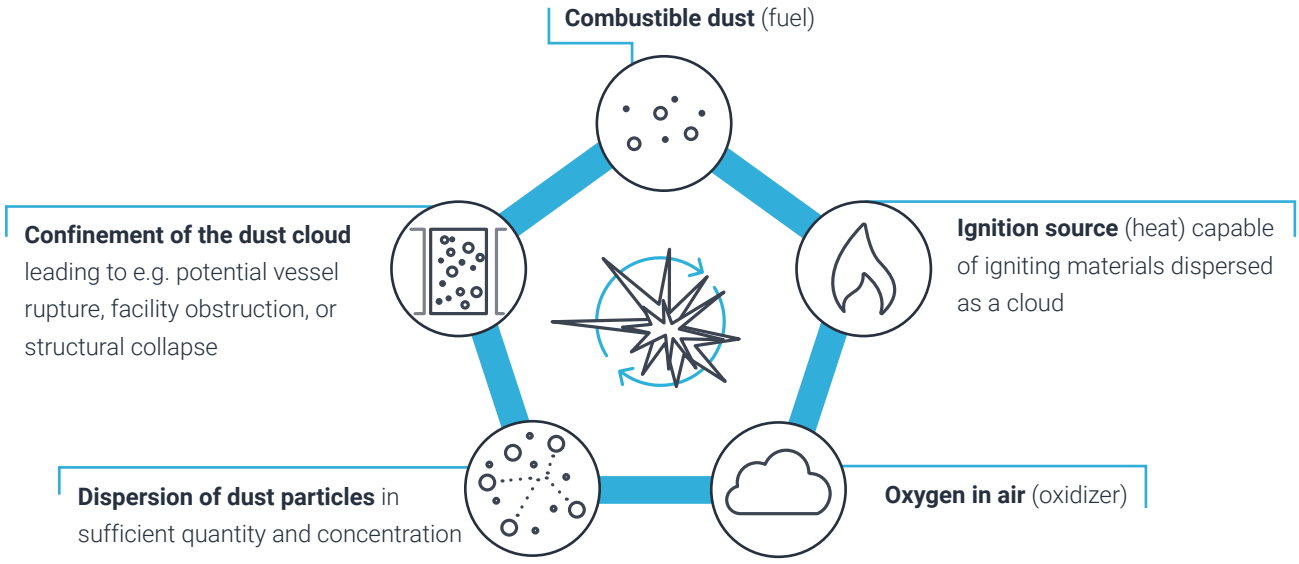
The minimum concentration of dust needed to create an explosion is the lower explosive limit varying on the dust type, typically around 10-40 grams per cubic meter.

When a dust cloud is suspended in air and reaches its lower explosive limit, it can be ignited by a heat source like a spark or a flame. When the dust ignites, it burns rapidly and releases a large amount of energy (traveling with speeds up to 1,000 miles per hour).

Combustible dust explosions often come in twos. The primary and the secondary. The primary explosion occurs when dust suspension in a confined space is ignited and then explodes. Also, it will dislodge and ignite other accumulated airborne dust. Often, the second explosion is even more destructive.

The Dust Explosion Pentagon

What does it take to cause an explosion?
Each element of the Pentagon five.



Explosions can't occur if one element is missing.

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