

Information on Testing for Combustible Dust

Combustible dust hazard analysis is common practice in some industries. A wide number of products can be a combustible dust. Combustible dust can result in explosions that in some cases, can destroy an entire facility.



A bulk dust sample is collected and sent to an accredited laboratory for testing. Basically, the dust is tested to see if it is explosive or combustible at all and if it is, a secondary testing can be performed to see specifically how explosive or combustible the dust is.

Collecting A Bulk Dust Sample

Generally speaking, it is recommended that samples be taken from the “dirty” side of dust collectors since that material tends to include relatively dry, small particles. The “best samples” are taken from dust collectors as directed below:

- Use non-sparking tools to scrape or otherwise remove the material directly from the dust collector filters or cartridges. This technique will increase the probability of collecting fine particles.
- If it is not feasible to remove the material directly from the dust collector filters or cartridges, “pulse” the dust collector prior to collecting the sample from a clean storage collection drum/container.
- If possible, avoid taking samples from the dust collection drum/container (e.g., 55 gallon drum) unless the drum/container has been emptied or cleaned before a “pulsed” sample is generated (see above). Otherwise, the sample will include a composite of material discharged from the dust collector that has the potential of including larger particles that may understate the risk posed by the material. Because of their mass, larger particles may “fall” into the collection drum/container without being collected onto the filters or cartridges. In this case, screening may be warranted to remove those coarse particles.

“Elevated surfaces” provide another preferred location to sample since smaller particle material tends to rise, disperse (aka, “float”), and collect on building steel, pipes, ductwork, and the tops of equipment. Often times, a vertical lift is required to safely access such areas for sampling purposes. Collecting samples from elevated surfaces is most appropriate in operations where dust collection systems do not exist. Relatively dry, small particle material suitable for testing may also be found on the interior walls of bins and ductwork.

Generally speaking, the “age” of the sample is unimportant. The primary exception relates to metal dust. Since explosible characteristics of metal dust can be understated if the sample material is allowed to oxidize, it is advised that “fresh material” be sampled. These “fresh samples” should be tightly sealed to prevent entry of moisture.

Use of non-sparking equipment (e.g., natural bristle brushes, plastic antistatic shovels, scoops, or dust pans) is recommended to collect samples. Samples should be collected in sealed plastic (e.g., Ziploc) bags or other sealed, non-conductive containers. Sample size requirements vary (see chart below) dependent upon the test(s) that will be conducted. It is always best to send the lab more than they need rather than not enough to perform the analysis.

Samples should be clearly labeled to identify the location where they were taken. In some cases, more than one sample is collected – either for completeness or because different processes produce different dusts (different in either composition or size distribution).

Laboratory Requirements for Sample Size and Prices

Test Name	Description	Sample Size	Cost
Material Preparation	Sieving or milling sample to less than 200 mesh and/or drying sample to less than 5% moisture as per ASTM recommendations	N/AP	\$340/sample
Explosibility Screening Test	Based on VDI 2263 Part 1 section 2.1.1 and ASTM E1226 Section 13, this test is to determine if a dust cloud is explosible.	> 200 grams	\$660/sample
Combustible Dust Screening Test	Based on VDI 2263 and UN 4.1 combustion testing. This test is to determine if a dust in a pile supports self-sustaining flame propagation.	>30 grams	\$660/sample
Explosibility + Combustible Dust Screening Package	The two above tests as a package.	>230 grams	\$940/sample
Administration	Picking up of sample, shipping sample to lab, report preparation and administration	N/AP	\$200

The above testing is considered the minimum testing requirement to determine if a dust sample is combustible or explosive. If the material is found to be combustible or the next step would be “Severity Test” which can include the following parameters:

- Minimum Ignition Temperature
- Minimum Ignition Energy
- Minimum Explosive Energy
- Minimum Autoignition Temperature
- Maximum Explosion Pressure
- Rate of Pressure Rise (KSt)

Often, a company does not need the specifics but would rather focus on controls for combustible dust. In the United States, the Occupational Safety and Health Administration has put an emphasis on combustible dust testing and typically requires a package of tests as described in the list above. If these additional tests are required, these tests can be arranged and come as a packet of tests to satisfy the OSHA requirement. However, the first step is the initial tests provided in the table on the second page of this document.

When providing a sample, please include a copy of the Safety Data Sheet for the product or material that is the source of the dust.

I hope this information is of assistance to you. Should you have any questions, or if we can be of any further assistance, please contact me at (204) 668-3141.

Sincerely,

Douglas N. Wylie

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