

Combustible Dust

Does your company or firm process any of these products or materials in powdered form?

If your company or firm processes any of these products or materials, there is potential for a "Combustible Dust" explosion.

<p>Agricultural Products</p> <p>Egg white Milk, powdered Milk, nonfat, dry Soy flour Starch, corn Starch, rice Starch, wheat Sugar Sugar, milk Sugar, beet Tapioca Whey Wood flour</p>	<p>Cottonseed Garlic powder Gluten Grass dust Green coffee Hops (malting) Lemon peel dust Lemon pulp Linseed Locust bean gum Malt Oat flour Oat grain dust Olive pellets Onion powder Parsley (dehydrated) Peach Peanut meal and skins Peat Potato Potato flour Potato starch Raw yucca seed dust Rice dust Rice flour Rice starch Rye flour Semolina</p>	<p>Soybean dust Spice dust Spice powder Sugar (10x) Sunflower Sunflower seed dust Tea Tobacco blend Tomato Walnut dust Wheat flour Wheat grain dust Wheat starch Xanthan gum</p>	<p>Chemical Dusts</p> <p>Adipic acid Anthraquinone Ascorbic acid Calcium acetate Calcium stearate Carboxy-methylcellulose Dextrin Lactose Lead stearate Methyl-cellulose Paraformaldehyde Sodium ascorbate Sodium stearate Sulfur</p>	<p>Epoxy resin Melamine resin Melamine, molded (phenol-cellulose) Melamine, molded (wood flour and mineral filled phenol-formaldehyde) (poly) Methyl acrylate (poly) Methyl acrylate, emulsion polymer Phenolic resin (poly) Propylene Terpene-phenol resin Urea-formaldehyde/cellulose, molded (poly) Vinyl acetate/ethylene copolymer (poly) Vinyl alcohol (poly) Vinyl butyral (poly) Vinyl chloride/ethylene/vinyl acetylene suspension copolymer (poly) Vinyl chloride/vinyl acetylene emulsion copolymer</p>
<p>Agricultural Dusts</p> <p>Alfalfa Apple Beet root Carrageen Carrot Cocoa bean dust Cocoa powder Coconut shell dust Coffee dust Corn meal Cornstarch Cotton</p>	<p>Carbonaceous Dusts</p> <p>Charcoal, activated Charcoal, wood Coal, bituminous Coke, petroleum Lampblack Lignite Peat, 22%H_2O Soot, pine Cellulose Cellulose pulp Cork Corn</p>	<p>Metal Dusts</p> <p>Aluminum Bronze Iron carbonyl Magnesium Zinc</p>	<p>Plastic Dusts</p> <p>(poly) Acrylamide (poly) Acrylonitrile (poly) Ethylene (low-pressure process)</p>	

Dust Control Measures

The dust-containing systems (ducts and dust collectors) are designed in a manner (i.e., no leaking) that fugitive dusts are not allowed to accumulate in the work area.

The facility has a housekeeping program with regular cleaning frequencies established for floors and horizontal surfaces, such as ducts, pipes, hoods, ledges, and beams, to minimize dust accumulations within operating areas of the facility.

The working surfaces are designed in a manner to minimize dust accumulation and facilitate cleaning.

Ignition Control Measures

Electrically-powered cleaning devices such as vacuum cleaners, and electrical equipment are approved for the hazard classification for Class II locations.

The facility has an ignition control program, such as grounding and bonding and other methods, for dissipating any electrostatic charge that could be generated while transporting the dust through the ductwork.

The facility has a Hot Work permit program.

Areas where smoking is prohibited are posted with "No Smoking" signs.

Duct systems, dust collectors, and dust-producing machinery are bonded and grounded to minimize accumulation of static electrical charge.

The facility selects and uses industrial trucks that are approved for the combustible dust locations.

Prevention Measures

The facility has separator devices to remove foreign materials capable of igniting combustible dusts.

MSDSs for the chemicals which could become combustible dust under normal operations are available to employees.

Employees are trained on the explosion hazards of combustible dusts.

Protection Measures

The facility has an emergency action plan.

Dust collectors are not located inside of buildings. (Some exceptions)

Rooms, buildings, or other enclosures (dust collectors) have explosion relief venting distributed over the exterior wall of buildings and enclosures.

Explosion venting is directed to a safe location away from employees.

The facility has isolation devices to prevent deflagration propagation between pieces of equipment connected by ductwork.

The dust collector systems have spark detection and explosion/deflagration suppression systems.

Emergency exit routes are maintained properly.





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[Date]

CEO of the Facility
[Company]
[Company2]
[Address]
[City], [State] [Zip]

Dear Sir/Madam:

I am writing today to bring to your attention an issue of critical importance to you, your employees and your company. The purpose of this letter is to emphasize how critical it is for the safety of your employees that you comply with all applicable OSHA standards, in particular those relevant to combustible dust. To highlight the significance of this issue, OSHA has launched a National Emphasis Program and is distributing the enclosed Safety and Health Information Bulletin (SHIB). Combustible dusts are often either organic or metal dusts that are finely ground into very small particles, fibers, fines, chips, chunks, flakes, or a small mixture of these. When these particles become airborne and come in contact with an ignition source a deadly explosion could occur.

Your establishment has been identified as being in an industry that often faces this potentially deadly hazard. To assist your organization in identifying and abating combustible dust hazards, I am enclosing a copy of OSHA's SHIB titled Combustible Dust in Industry: Preventing and Mitigating the Effects of Fire and Explosions. It is imperative that you take the time to review the information in this bulletin and take necessary steps to prevent such potentially lethal hazards. Failure to attend to housekeeping standards or to conduct maintenance on your ventilation systems or electrical controls places your employees and your facility at risk.

OSHA is available to provide assistance to companies facing all types of safety and health hazards. OSHA's onsite consultation program, which is designed primarily for small employers (companies of 250 or fewer employees) can help you identify safety and health hazards including combustible dust hazards in your workplace and find effective solutions for eliminating or controlling those hazards. This program is administered by a state agency and operated separately from OSHA's enforcement program. The service is free and confidential. In addition, the OSHA state consultant can assist you in developing and implementing a safety and health management system for your workplace.

If you have any further questions, please call you local OSHA Area Office or your state's consultation program. Information on both is available at www.osha.gov. Thank you for your attention to this very important matter.

Sincerely,

Edwin G. Foulke, Jr.
Assistant Secretary

OSHA[®] FactSheet

Hazard Alert: Combustible Dust Explosions

Combustible dusts are fine particles that present an explosion hazard when suspended in air in certain conditions. A dust explosion can be catastrophic and cause employee deaths, injuries, and destruction of entire buildings. In many combustible dust accidents, employers and employees were unaware that a hazard even existed. It is important to determine if your company has this hazard, and if you do, you must take action now to prevent tragic consequences.

How Dust Explosions Occur

In addition to the familiar fire triangle of oxygen, heat, and fuel (the dust), dispersion of dust particles in sufficient quantity and concentration can cause rapid combustion known as a deflagration. If the event is confined by an enclosure such as a building, room, vessel, or process equipment, the resulting pressure rise may cause an explosion. These five factors (oxygen, heat, fuel, dispersion, and confinement) are known as the “Dust Explosion Pentagon”. If one element of the pentagon is missing, an explosion cannot occur.

Catastrophic Secondary Explosions

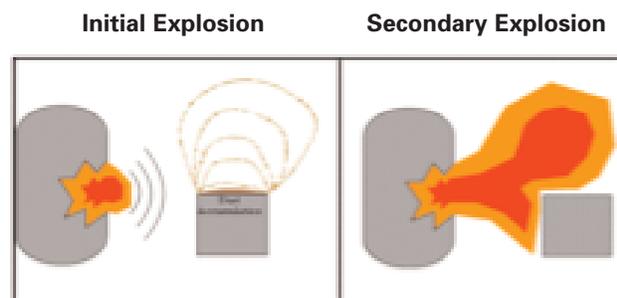
An initial (primary) explosion in processing equipment or in an area where fugitive dust has accumulated may dislodge more accumulated dust into the air, or damage a containment system (such as a duct, vessel, or collector). As a result, if ignited, the additional dust dispersed into the air may cause one or more secondary explosions. These can be far more destructive than a primary explosion due to the increased quantity and concentration of dispersed combustible dust. Many deaths in past accidents, as well as other damage, have been caused by secondary explosions.



A pharmaceutical plant after a dust explosion.

Industries at Risk

Combustible dust explosion hazards exist in a variety of industries, including: agriculture, chemicals, food (e.g., candy, sugar, spice, starch, flour, feed), grain, fertilizer, tobacco, plastics, wood, forest, paper, pulp, rubber, furniture, textiles, pesticides, pharmaceuticals, tire and rubber manufacturing, dyes, coal, metal processing (e.g., aluminum, chromium, iron, magnesium, and zinc), recycling operations, and fossil fuel power generation (coal).



Prevention of Dust Explosions

To identify factors that may contribute to an explosion, OSHA recommends a thorough hazard assessment of:

- All materials handled;
- All operations conducted, including by-products;
- All spaces (including hidden ones); and
- All potential ignition sources.

Dust Control Recommendations

- Implement a hazardous dust inspection, testing, housekeeping, and control program;
- Use proper dust collection systems and filters;
- Minimize the escape of dust from process equipment or ventilation systems;
- Use surfaces that minimize dust accumulation and facilitate cleaning;
- Provide access to all hidden areas to permit inspection;
- Inspect for dust residues in open and hidden areas at regular intervals;
- If ignition sources are present, use cleaning methods that do not generate dust clouds;
- Use only vacuum cleaners approved for dust collection; and
- Locate relief valves away from dust deposits.

Ignition Control Recommendations

- Use appropriate electrical equipment and wiring methods;
- Control static electricity, including bonding of equipment to ground;
- Control smoking, open flames, and sparks;
- Control mechanical sparks and friction;
- Use separator devices to remove foreign materials capable of igniting combustibles from process materials;
- Separate heated surfaces from dusts;
- Separate heating systems from dusts;
- Select and use industrial trucks properly;
- Use cartridge activated tools properly; and
- Use an equipment preventive maintenance program.

Injury and Damage Control Methods

- Separation of the hazard (isolate with distance);
- Segregation of the hazard (isolate with a barrier);
- Deflagration isolation/venting;
- Pressure relief venting for equipment;
- Direct vents away from work areas;
- Specialized fire suppression systems;
- Explosion protection systems;

- Spark/ember detection for suppression activation;
- Develop an emergency action plan; and
- Maintain emergency exit routes.

Applicable OSHA Requirements Include:

- §1910.22 Housekeeping
- §1910.307 Hazardous Locations
- §1910.1200 Hazard Communication
- §1910.269 Electric Power Generation, Transmission and Distribution (coal handling)
- §1910.272 Grain Handling Facilities
- General Duty Clause, Section 5(a)(1) of the *Occupational Safety and Health Act* (Employers must keep workplaces free from recognized hazards likely to cause death or serious physical harm).

Resources

Readily available from www.osha.gov are:

- Combustible Dust National Emphasis Program
- Safety and Health Information Bulletin (SHIB) (07-31-2005) *Combustible Dust in Industry: Preventing and Mitigating the Effects of Fires and Explosions*

See the SHIB or www.osha.gov for other applicable standards.

The primary National Fire Protection Association (NFPA) consensus standards related to this hazard are:

- NFPA 654, Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids
- NFPA 61, Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities
- NFPA 484, Standard for Combustible Metals
- NFPA 664, Standard for the Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities
- NFPA 655, Standard for the Prevention of Sulfur Fires and Explosions
- See www.nfpa.org to view NFPA standards.

This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.

For more complete information:



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(800) 321-OSHA

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