OSHA | Oregon OSHA
Department of Consumer and Business Services

Hazard alert

Combustible Dust

The ignition of dust has resulted in workplace injuries and deaths nationwide; incidents in Oregon include a wood-dust fireball, dust flash from powder-coating filters, and a grain-dust explosion.

Combustible dust is defined by Federal OSHA as, "finely divided solid particulates of a substance or mixture that pose a flash-fire hazard or explosion hazard when dispersed in air or other oxidizing media."

A combustible dust explosion hazard may exist in a variety of industries, including food (such as candy, starch, flour, feed), plastics, wood, rubber, furniture, textiles, pesticides, pharmaceuticals, dyes, coal, metals (such as aluminum, chromium, iron, magnesium, and zinc), and fossil-fuel power generation. The vast majority of natural and synthetic organic materials, as well as some metals, can form combustible dust. The National Fire Protection Association (NFPA) Industrial Fire Hazards Handbook states: "Any industrial process that reduces a combustible material and some normally noncombustible materials to a finely divided state presents a potential for a serious fire or explosion."

The primary factor in an assessment of these hazards is whether the dust is in fact combustible. Any "material that will burn in air" in a solid form can be explosive when in a finely divided form. Different dusts of the same chemical material will have different ignitability and explosibility characteristics, depending on variables such as particle size, shape, and moisture content.

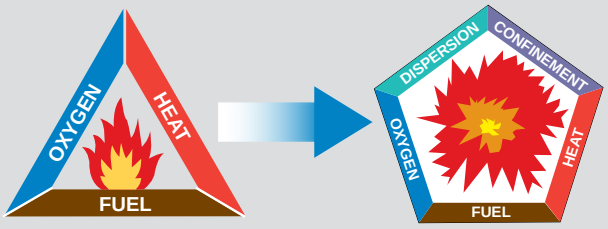
One source for information on combustibility is the safety data sheet (SDS). In some cases, additional information is available from chemical manufacturers, such as test results.

Dust Fire and Explosion Pentagon

While most of us are familiar with the standard "Fire Triangle," a combustible dust explosion consists of five elements, also known as the "Dust Explosion Pentagon."

How do dust explosions occur?

When fuel (combustible dust) is dispersed and confined in an enclosed space or building, ignition can result in an explosion.



Fire Triangle — Explosion Pentagon

Source: Federal OSHA

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Facilities should carefully identify the following to assess their potential for dust explosions:

- Materials that can be combustible when finely divided
- Processes that use, consume, or produce combustible dusts
- Open areas where combustible dusts may build up
- Hidden areas where combustible dusts may accumulate
- Means by which dust may be dispersed in the air
- Potential ignition sources

All employees should be trained in safe work practices applicable to their job tasks, as well as on overall plant programs for dust control and ignition source control. They should be trained before they start work, periodically to refresh their knowledge, when reassigned, and when hazards or processes change.

Employers with hazardous chemicals (including combustible dusts) in their workplaces are required to comply with 1910.1200, the Hazard Communication standard. This includes having labels on containers of hazardous chemicals, using safety data sheets, and providing employee training.

Resources

- Oregon OSHA Program Directive: Combustible Dust
- Federal OSHA Bulletin: Combustible Dust in Industry
- National Fire Protection Association

> Regardless of particle size or shape, combustible dust in a workplace presents a fire or deflagration hazard when suspended in air or some other oxidizing medium over a range of concentrations.

Hazard alerts provide information on hazardous materials, equipment, or practices. For more information, contact the Oregon OSHA Standards and Technical Resources Section at 503-378-3272 or 800-922-2689 (toll-free), or visit our website at osha.oregon.gov.