

# Important NFPA Standards for Manufacturing Processes that Create Combustible Dust

*If your facility handles, transfers, packages or processes dust-producing materials or powders, you could face an explosion risk from combustible dust.*

By Brian Richardson | Sep 26, 2019

---

If your facility handles, transfers, packages or processes dust-producing materials or powders, you could face an explosion risk from combustible dust. A dust explosion occurs when a confined and concentrated combustible dust cloud comes into contact with an ignition source. A primary explosion is the first point where an explosion occurs and is often an isolated incident. A secondary explosion occurs when the primary explosion pressure disturbs dust that has collected in the workplace, resulting in a much more extensive explosion.

Maintaining a clean facility and operating a dust collection system that is properly designed for your specific operation can significantly reduce combustible dust in the work environment. The National Fire Protection Association (NFPA) sets safety standards for managing combustible dust. Most insurance agencies and local fire codes require companies to follow NFPA standards. Exceptions are made when the authority having jurisdiction (AHJ), such as Factory Mutual or local fire marshals, specifies an alternative safety approach. However, the alternative approach might be even more stringent.

Here are important NFPA standards you need to be aware of if your facility handles combustible dust:

**NFPA 652—Standard on the Fundamentals of Combustible Dust.** This standard covers the requirements for managing combustible dust fires and explosions across industries, processes, and dust types. It requires the owner or operator of any facility where combustible dust exists to conduct a dust hazard analysis (DHA), develop a plan for managing fire and explosion dangers, and provide training for workers who potentially could be affected by the hazards.

Facility operators and their health and safety managers can conduct the DHA internally or use an independent consultant. Ultimately, the authority having jurisdiction will review the findings and grant approval. The DHA must be completed by the fall of 2020 and demonstrate reasonable progress toward completion of the DHA in each of the years approaching the deadline.

A complete dust hazard analysis includes the process machinery that produces dust and the dust collection system itself. Many dust collector fires and explosions occur after a fire outside the collector produces flames or sparks that are drawn into the collector. DHA considerations for the dust collection system include documenting all possible hazards associated with the dust collector and the controls used to mitigate them. Appendix B of NFPA 652 provides guidance on performing a thorough DHA.

**NFPA 654—Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids.** This is an all-encompassing standard on how to design a safe dust collection system. It points to more specific standards, depending on the nature and severity of the hazard potential, that deal with different types of dust and explosion protection equipment, such as explosion venting and deflagration protection.

**NFPA 68—Standard on Explosion Protection by Deflagration Venting.** This standard focuses on explosion venting on devices and systems that vent combustion gases and pressures resulting from a deflagration within an enclosure in order to minimize structural and mechanical damage.

**NFPA 69—Standard on Explosion Prevention Systems.** This standard extends beyond explosion venting to address the whole dust collection system. It includes inlet and outlet ducting, spark-extinguishing systems, and methods for preventing an explosion from traveling back into the building or to process locations upstream of inlet duct work.

**NFPA 70—National Electrical Code (NEC).** The NEC covers everything related to the installation of electrical equipment across all industries and all types of buildings. This code is enforced in all 50 states. Two sections of NFPA 70 apply to housekeeping: combustible dust definition and hazardous locations. NFPA 70 defines combustible dust as “dust particles that are 500 microns or smaller and present a fire or explosion hazard when dispersed and ignited in air.” The NEC defines different classes of hazardous (classified) and non-hazardous locations. These classes determine the wiring of buildings and also the equipment and housekeeping procedures that can be used in different areas of facilities.

**NFPA 91—Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Particulate Solids.** This standard includes duct system designs that enable the

correct velocity to keep the duct clean and the correct strength to keep the duct from rupturing.

## Industry-Specific Standards

**NFPA 61– Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities.** This standard is for facilities engaged in dry agricultural bulk materials including grains, oilseeds, agricultural seeds, legumes, sugar, flour, spices, feeds, starch, and other related materials. Examples of facilities covered by NFPA 61 include, but are not limited to, bakeries, grain elevators, feed mills, flour mills, corn and rice mills, dry milk products, mix plants, soybean and other oilseed preparation operations, cereal processing, snack food processing, tortilla plants, and chocolate processing.

**NFPA 484—Standard for Combustible Metals.** This standard covers all metals and alloys that are in a form capable of combustion or explosion. It also applies to processing or finishing operations that produce combustible metal powder or dust such as machining, sawing, grinding, buffing and polishing. It outlines procedures for determining whether a metal is in a combustible or noncombustible form. Parts that contain multiple metals or alloys are subject to the requirements of the metal whose combustion characteristics they most closely match.

**NFPA 655—Standard for Prevention of Sulfur Fires and Explosions.** This standard is designed to eliminate or reduce hazards encountered in the crushing, grinding, and pulverizing of bulk and liquid sulfur. Housekeeping requirements addressing the hierarchy of cleaning methods and the frequency of housekeeping are based upon rate of accumulation of combustible dusts.

**NFPA 664—Standard for the Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities.** This standard establishes the minimum fire and explosion prevention requirements for facilities that process wood or manufacture wood products using wood or cellulosic fibers, creating wood chips, particles or dust. Examples include wood flour plants, industrial woodworking plants, furniture plants, plywood plants, composite board plants, lumber mills, and production-type woodworking shops and carpentry shops that meet minimum requirements for plant size or dust collection flow rates.

---

## About the Author

*Brian Richardson is the Technical Departments Manager at Camfil Air Pollution Control (APC).*

