



# COMBUSTIBLE DUST COMPLIANCE GUIDE



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# Do I Need to Use a Wet Collector?

## Legacy Metals

(Titanium, Magnesium, Niobium, Tantalum, Zirconium, Hafnium)

**YES! REQUIRED**

Your application requires a wet collection system per NFPA and OSHA regulations with very few exceptions. See our WD Series of Wet Collectors and our information on the code requirements for combustible dusts.

## Aluminum Dust

**HIGHLY RECOMMENDED**

Your application could require a wet collection system or a dry style system with specialty alarms per NFPA and OSHA. See our article on the specific criteria for compliance of combustible dusts.

However, we highly recommend a wet style system for ease of compliance.

## Other Metal Dust

**TYPICALLY NO**

Typically you do not need to use a wet collector. Consult specific NFPA Standards and Superior Air Products for product selection specifics. See our dry style cartridge collector products to learn more.

**SEE OUR DRY PRODUCT OPTIONS**



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# Combustible Dust Management Basics

## Legacy Metals (Titanium, Magnesium, Niobium, Tantalum, Zirconium, Hafnium)

1. Either accept that dust is hazardous (combustible) or perform the required dust testing. A simple go/no-go test is around \$1,000. If determined not explosive, then you still must provide a Dust Hazard Analysis, but may not need to provide dust collection. In the majority of cases (over 90%) the dust will be considered explosive and then further testing can be performed to determine KST value and how explosive it is.
2. Perform a Dust Hazard Analysis as required by NFPA. This should be performed with in house personnel and a qualified expert such as Superior Air Products or other combustible dust specialists. This analysis will identify areas where dust capture is required and/or hazards exist.
3. Do I have to capture the dust? Yes, as required by NFPA and OSHA, engineering controls (i.e. Dust Collection) is required to mitigate the hazard.
4. Can I use wet or dry style dust collectors? For these metals, unless specifically proven otherwise, you must use a wet collector. Aluminum is the lone exception. See notes below. The specific regulations state if the dust is over 150 KST (all of the above are) you shall NOT USE:
  - Dry Style Dust Collectors
  - Enclosureless Dust Collectors
  - Electrostatic Dust Collectors
  - Dry Type Downdraft Tables
  - Dry Type Environmental Control Booths

## Exceptions for Aluminum Dust

If tested and below 150 KST, dry style dust collection can be used for aluminum dust if, and only if:

- The dust collector holds less than 0.5 lbs of dust and is emptied daily.
- The Dust Hazard Analysis is signed off on showing it is an acceptable risk.
- The dry style collector includes an audible and visual overheating alarm system for when temperature exceeds 122 degree Fahrenheit.
- Dry Style Dust Collectors shall be self cleaning and continuously monitored by a filter gauge.

5. If utilizing a wet collector:

The wet collector shall meet or exceed the design efficiency or combustible dust collection at all times during normal operation. In other words, the wet collector must have design parameters to make sure the water levels are interlocked with safety features to shut down the collector if water levels are outside the acceptable range. Superior Products come standard with high/low water alarms and safety interlocks.

Sludge level buildup in the sludge tank shall not exceed 5% of the tank liquid capacity as measured by volume.

The wet collector shall be interlocked to the dust producing equipment where applicable.

Use of dry filter media downstream or combined with a wet collector shall be prohibited. Unless equipped with separate differential pressure alarm, static dissipative media, a means to limit hydrogen accumulation to 10% of the LFL, a high temperature alarm.

Exhaust vent shall terminate outside building except when the collector's efficiency is great enough to provide safety in the particular installation with regard to particulate matter in the cleaned air and accumulations of particulate matter and hydrogen in the area.

# Understanding Regulations, Requirements and Compliance While Working with Combustible Dust.

When dealing with combustible dust or explosive dust in manufacturing and processing facilities, there has been a far greater awareness and implementation of safety processes and procedures since the implementation of the OSHA National Emphasis Program on combustible dust in March of 2008. After some initial confusion because this was issued as a National Emphasis Program rather than a standard, most employers are now aware of the responsibility to address combustible dust issues. There are several factors that affect compliance:

## OSHA Directive

Even though this is an “emphasis program”, OSHA can find violations in the general duty clause, hazard communication standard and housekeeping standard. **OSHA can and will levy fines based on these violations.** See link below to OSHA site examples.

## National Fire Prevention Association (NFPA)

NFPA develops, publishes, and disseminates more than 300 consensus codes and standards intended to minimize the occurrence and effects of fire and other risks. Virtually every building, process, service, design, and installation in society today is affected by NFPA documents. These standards may be viewed online at NFPA Codes and Standards .

**OF SIGNIFICANT NOTE, ALL OF THESE STANDARDS ARE APPLICABLE RETROACTIVELY**

Those related directly to combustible dust explosion hazards are:

- **NFPA 61**, Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities
- **NFPA 484**, Standard for Combustible Metals
- **NFPA 654**, Standard for the Prevention of Fires and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids
- **NFPA 655**, Standard for Prevention of Sulfur Fires and Explosions
- **NFPA 664**, Standard for the Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities

## FM Global

These Standards address aspects of combustible dust hazards:

- Property Loss Prevention Data Sheet 7-73, Dust Collectors and Collection Systems
- Property Loss Prevention Data Sheet 7-76, Prevention and mitigation of Combustible Dust Explosion and Fire

## International Code Council (ICC)

These Standards address aspects of combustible dust hazards:

- International Building Code
- International Fire Code
- International Mechanical Code

## Consensus Standards and the General Duty Clause

The General Duty Clause, Section 5(a)(1) of the OSHA Act, can be used to cite employers that fail to keep a workplace free of hazards, but only where there is no OSHA standard that applies to the particular hazard involved. In evaluating such situations, the hazard must be recognized (by industry or the employer), must have caused or be likely to cause death or serious physical harm, and a feasible means to correct the hazard must be available. Consensus standards may be used to provide a feasible means of abatement and establish employer and industry knowledge.

Section 5(a)(1) is not:

- Used to enforce “should” standards.
- Used to require abatement methods not required by a specific standard.
- Normally used to cover categories of hazards exempted by an OSHA standard.

## AHJ Authorities Having Jurisdiction

Typically fire marshals and building code enforcement. More than any other, these agencies typically reference back to NFPA.

## Insurers

This has been a primary driver in compliance with the standards as insurers push to mitigate risks associated with combustible dust as knowledge of the problem has increased over time.

Superior Air Products is focused on helping you comply with all parties when dealing with combustible dusts. There are many white papers available on the actual clear and present dangers of combustible dust in the workspace, so we are going to presume at this point you are aware of the topic and the risks associated with it.

# Combustible Dust Guide Specifics

The following summarizes some General Duty Clause citations issued by OSHA under the Combustible Dust NEP:

1. Dust collectors were located inside buildings without proper explosion protection systems, such as explosion venting or explosion suppression systems.
2. Deflagration isolation systems were not provided to prevent deflagration propagation from dust handling equipment to other parts of the plant.
3. The rooms with excessive dust accumulations were not equipped with explosion relief venting distributed over the exterior walls and roofs of the buildings.
4. The horizontal surfaces such as beams, ledges and screw conveyors at elevated surfaces were not minimized to prevent accumulation of dust on surfaces.
5. The ductwork for the dust collection system did not maintain a velocity of at least 4500 ft/min to ensure transport of both coarse and fine particles and to ensure re-entrainment.
6. Flexible hoses used for transferring reground plastics were not conductive, bonded or grounded to minimize generation and accumulation of static electricity. A non-conductive PVC piping was used as ductwork. Ductwork from the dust collection system to other areas of the plant was not constructed of metal.
7. All components of dust collection system were not constructed of noncombustible materials in that cardboard boxes were being used as collection hoppers.
8. Equipment such as grinders, shakers, mixers and ductwork were not maintained to minimize escape of dust into the surrounding work area. Employer did not prevent the escape of dust from the packaging equipment, creating a dust cloud in the work area.
9. Interior surfaces where dust accumulations could occur were not designed or constructed to facilitate cleaning and to minimize combustible dust accumulations. Regular cleaning frequencies were not established for walls, floors, and horizontal surfaces such as ducts, pipes, hoods, ledges, beams, etc.
10. Compressed air was periodically used to clean up the combustible dust accumulation in the presence of ignition sources.
11. Air from dust collector was recycled through duct work back into the work area without the protection of a listed spark detection system, high speed abort gate and/or functioning extinguishing system.
12. Air displaced during filling and emptying at the packaging and weighing systems which was discharged into the building was cleaned with a filter that was not 99.9 percent efficient at 10 microns.
13. Exhaust ventilation systems were not installed to control dust clouds escaping from blending and other processing machinery.
14. Bulk material conveyor belts were not equipped with bearing temperature, belt alignment, and vibration detection monitors at the head and tail pulleys to shut down equipment and/or notify the operator before the initiation of a fire and/or explosion.
15. Enclosureless systems were allowed indoors where they were connected to sanders having mechanical feeds; where they were not emptied at least daily; where they were located in areas routinely occupied by personnel; and where they were not separated by at least 20 feet.
16. Silos, legs of bucket elevators were not equipped with explosion relief venting.
17. Explosion vents on dust collectors and bucket elevators were directed into work areas and not vented to a safe, outside location away from platforms, means of egress, or other potentially occupied areas.
18. The dust collector's baghouse automatic pulse cleaning system was nonoperational due to equipment defects. The dust collector systems' hoods and ductwork were in disrepair with substantial air leaks in the ductwork created by missing inspection covers, unused opening, incomplete or poorly designed capture hoods and physical damage.
19. A dust collector collecting aluminum dust was located inside a building and not located outside with appropriate venting and other safeguards to protect employees in the event of an explosion.
20. Dust collectors were allowed to be shutdown periodically during unloading operations resulting in the creation of dust clouds in the processing areas. Procedures were not established to shut down related machinery if the dust collection system shuts down.
21. Collection points used for manual cleanup of wood dust and other foreign material including metal were not provided with magnetic separators, grates or other types of screening to prevent foreign material from entering into the dust collection system.
22. Automatic sprinkler systems were not provided on enclosureless dust collectors operating at 5500 cfm capacity, and were not separated by at least 20 feet from each other when located inside the buildings.
23. Process Hazard Analysis was not conducted to determine whether the process hazards necessitated the installation of approved devices such as explosion protection systems, interlocked rotary valves, deflagration vents, and flame front diverters.
24. Employees were exposed to explosion hazards due to the nitrogen blanketing piping disengaging from the mixer/blender during the mixing process.
25. Mixers and blenders used for the production of pulverized collagen was not dust-tight and not equipped and provided with explosion prevention, relief and techniques.
26. Miter saw was not maintained under continuous suction, thus allowing escape of dust during normal operation.
27. The Coalpactors (hammer mills) used to crush coal and their connected feed chutes were not equipped with protective systems to prevent or mitigate a deflagration in the event of an ignition of combustible coal dust inside the Coalpactors.
28. The company had not developed and implemented written Management of Change procedures for ensuring that potential changes to production equipment and dust control equipment do not result in fires, deflagrations and dust explosions.
29. Screw conveyors or screw augers were not provided with deflagration isolation devices, such as, but not limited to, deflagration/explosion relief venting, containment, or isolation to prevent continued propagation flame front and over pressure into adjacent building/structures or equipment.
30. The employer did not provided adequate maintenance and design of dust collector systems creating insufficient air aspirations, low duct velocities and blocked ducts.
31. Propane burners with open flames were used in the area where agricultural products were ground.
32. Employees were using electric grinder(s) on a duct entering a baghouse style dust collector without a hot work permit system.

OSHA found that the majority of facilities inspected under the NEP had dust collectors located inside the buildings without proper explosion protections systems , such as explosion vents or explosion suppression systems.

## Average Number Violations Issued Per Inspection

The average number of violations per NEP inspection is 6.5 in Federal enforcement as compared to 3.1 for the other inspections (See Figure 8). This means that OSHA is finding twice the number of violations at combustible dust handling facilities when compared to all other facilities in general.