
ADF Engineering White Paper

Impact of OSHA's Combustible Dust National Emphasis Program (NEP)

Background of OSHA Combustible Dust NEP:

In response to a series of significant incidents related to combustible dust explosions, deflagrations and fires, OSHA issued an instruction on October 18, 2007, to create a National Emphasis Program (NEP) and provide inspectors with criteria for evaluating the potential for combustible dust hazards. However, a subsequent catastrophic explosion at a major sugar refinery in Georgia led to the issuance of OSHA Directive CPL-03-00-008 on March 12, 2008, which is intended to intensify inspections and enforcement of the NEP, including random inspections and significant fines for non-compliance.

The OSHA directive details inspection frequency and scheduling, resource allocation and a listing of target industries, based on their history and likelihood of combustible dust incidents. These targeted industries include the following:

- Corn Wet Milling
- Flour & Grain Milling
- Food Manufacturing
- Pharmaceutical Preparations
- Specialty Chemicals
- Paper Pulp
- Flavoring Extracts, Syrups & Powders
- Gum & Wood Chemicals
- Coal Boilers
- Biosolids Handling & Processing

The applicable guidelines referenced in the OSHA Directive include the following NFPA and FM Global standards:

- NFPA 61, Fire and Dust Explosions in Agricultural and Food Processing Facilities – 2008
- NFPA 68, Explosion Prevention by Deflagration Venting – 2007
- NFPA 69, Explosion Prevention Systems – 2008
- NFPA 70, National Electrical Code – 2008
- NFPA 77, Recommended Practice on Static Electricity – 2007
- NFPA 85, Boiler & Combustion Systems Hazards – 2007

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- NFPA 499, Classification of Combustible Dusts and of Hazardous Locations for Electrical Installations in Chemical Process Areas – 2008
 - NFPA 654, Prevention of Fire and Dust Explosions from Manufacturing Combustible Particulate Solids
 - FM Global Data FM7-76

What you need to do to comply with the OSHA Directive:

1. Define the characteristics of your combustible dusts:

The first step to compliance with the OSHA NEP Directive is to understand the types and characteristics of the known or potentially combustible particulate solids and dusts that are handled in the facility. There are several third party laboratories that conduct combustible dust testing per ASTM standards, such as Chillworth Labs. They will provide a report with that describes the likelihood and severity of a deflagration involving the material tested. These testing labs will require about one liter of each material to be tested and will provide the following information:

- Kst – This is an index that indicates the rate of pressure rise due to a deflagration of the particulate. In other words, this is the key indicator of how explosive the material is once ignited. A Kst of zero indicates a non-combustible dust. A Kst over 200 indicates a highly explosive material. A Kst over 300 indicates a very strong explosive potential.
- Particle Size Distribution – A high concentration of particles under 40 microns will generally have a high potential for combustibility.
- Percent Moisture – Moisture has an inverse effect on combustibility and mitigates static discharges.
- Minimum Ignition Energy (MIE) – This is an indicator of how much energy is required to ignite a dust cloud or dust build-up.
- Minimum Ignition Temperature (MIT) – This indicates the minimum temperature required to ignite a dust cloud or build-up. All electrical equipment located in areas where build-ups can occur must be designed to operate below this temperature.
- Minimum Explosible Concentration (MEC) – This indicates the dust concentration in a cloud necessary to cause a sustained explosion.

2. Implement a robust and documented housekeeping program:

OSHA inspectors will look for combustible dust accumulations over 1/32", especially if a regular housekeeping program is not in place. It is your responsibility to document housekeeping procedures, training and frequency for the removal of dust layers. NFPA 654 is an excellent reference for understanding the requirements and methods for dust control utilizing regular housekeeping procedures.

3. Implement a documented training program on combustible dusts:

OSHA expects that employees are knowledgeable about all potential hazards in the workplace, including combustible dusts. A training program must be documented to demonstrate that employees understand the hazards associated with combustible dusts and the importance of proper dust accumulation housekeeping.

4. Ensure that proper area electrical classification is applied and that all ignition sources are isolated from potential dust clouds:

NFPA 499 provides guidelines for electrical classification in combustible dust hazard locations. An up-to-date electrical zone map is highly recommended. Additionally, the control of other potential ignition sources, such as the implementation of hot work permits and proper grounding, is essential.

5. Ensure that adequate preventive and protective measures are in place wherever combustible dust hazards exist:

These measures may include systems to prevent dust cloud formation, such as dust control and aspiration systems with outside venting, or explosion mitigation designs, such as building vent panels or suppression systems. NFPA 68 and 69 provide excellent references for explosion prevention and suppression.

ADF Engineering can help you to comply with OSHA's Directive:

ADF Engineering has extensive experience with the evaluation, design and integration of combustible dust programs and control and suppression equipment. We can help to identify the combustible dust hazards present at your facility and recommend the appropriate steps to ensure compliance with OSHA's National Emphasis Program on combustible dusts. Whether you need a documented training or housekeeping program, an electrical zone map or a design for a dust control system, ADF can provide your combustible dust program needs.

This is just some of what ADF Engineering can provide:

- Dust Characterization Support & Program Recommendations
- Housekeeping & Training Documentation
- Area Electrical Classification and Zone Maps
- Dust Control & Aspiration System Design
- Central Vacuum Collection
- Integration of Fire & Explosion Suppression Systems
- Explosion Relief Venting

For further information or a copy of the OSHA Directive, CPL-03-00-008, contact Matt Williamson at (937) 847-2700, or visit us on the web at www.adfengineering.com.