City Specification No. 406

Reference to CFC Chapter 13
NFPA Chapters 61, 69, 484, 654, 664
& City Specifications 423, 424

Huntington Beach Fire Department

Control of Combustible Dust and Combustible Particulate Material

This City Specification provides an overview of the operational requirements for combustible dusts and combustible particulate material control systems in manufacturing, processing, blending, conveying, and other types of processing facilities, where the materials present a fire, deflagration or explosion hazard.

For purposes of consolidation, the terms “combustible dust,” “combustible particulate material,” “dust,” and “particulate material” can be considered interchangeable.

DEFINITIONS

Air Separation Device – A device such as a baghouse, filtration media, or cyclone that separates particulate material entrained within an airstream before the air is released to the environment.

Combustible Dust – Finely divided solid materials 420 microns or less in diameter which, when dispersed in air in the proper proportions, could be ignited by flame, spark, or other source of ignition. Combustible dust will pass through a U.S. No. 40 standard sieve. Combustible dusts can be any particulate solid that presents a fire or deflagration hazard when suspended in air or some other oxidizing medium over a range of concentrations regardless of particle size and shape. Examples include:

- **Wood Particles** – Sawdust, grinding and sanding dusts, shavings, etc.
- **Foam Particles** – Foam shaping and blowing waste
- **Metal Particles** – From sanding, grinding, polishing, sawing, wire brushing or shot blasting operations
- **Other Finely Divided Dry Materials** – Fine powders and dry chemicals, powder coating material, plastic residues, bead blasting and sandblasting wastes, buffing wastes, linen and fabric residue, and dusts or particulate materials from the processing of grains or other foodstuffs.

Combustible Particulate Material – Any combustible solid material composed of distinct particles or pieces, regardless of size, shape or chemical composition.

Deflagration – Propagation of combustion that is less than the speed of sound, typically a rapid “flash-over” of an unconfined combustible material such as a dust or vapor. A confined deflagration that ruptures the confining container would be an explosion.

Dust Collection System – This is the entire system used to collect, convey, and capture dusts or particulate material created by processing operations. It includes initial accumulation equipment at the point of generation (nozzles, hoods or enclosures), ductwork to transport the dust, air separation equipment, exhaust venting, air blowers, electrical controls, secondary baghouses or filtration devices, and any fire protection system(s).

Fugitive Emissions – Particulates created by a processing unit that are not captured by a dust control mechanism and are able to float free before settling randomly within the facility.

Minimum Explosible Concentration (MEC) – The minimum concentration of a combustible dust suspended in air, measured in mass per unit on volume that will support deflagration.

REQUIREMENTS

1. PERMITS

1.1 **Fire Department** – A Fire Department Operational Permit is required for operations that produce combustible dusts. Fire Permits can be obtained from the Fire Department's Administration Office located at Huntington Beach City Hall. Fire Operational Permits are generally not required for portable or integrated dust collection devices, but may be required due to the composition, volume, hazard characteristics, or rate of production of the dust/particulate material being produced, or if it is determined the dust/particulate producing operation(s) create an unacceptable elevated risk of a fire or life safety hazard. Permeability will be at the sole discretion of the Fire Code Official or designee.

1.2 **Building Permits** – Mechanical, electrical, and structural building permits may be required to install or modify combustible dust and particulate control equipment at a facility. Building permits can be obtained by contacting the Department of Planning and Building.

1.3 **Air Quality Permits** – The South Coast Air Quality Management District (SCAQMD) may require permits for a dust-producing operation depending on the type and/or quantity of dust produced, or the volume of material processed at a facility.

1.4 **Hazardous Waste Permits and Registration** – If a production process generates a material that is considered a hazardous waste, you must register for, and obtain, an Environmental Protection Agency (EPA) hazardous waste identification number (EPA ID number) to have the waste removed from your facility. The EPA ID number registration forms can be found on the California Department of Toxic Substances Control (DTSC) website, or by calling the Orange County Health Care Agency (OCHCA).

2. PORTABLE OR INTEGRATED DUST COLLECTION DEVICES

2.1 Portable dust collection devices of less than 8 cubic feet collection capacity (one 55-gallon drum) designed to be moved between workstations, or dust control devices that are integral to processing equipment, are allowed. Examples of these

devices include mobile dust collection vacuum systems and filtration exhaust bags on portable woodworking equipment , filtration systems on metal processing equipment (sawing and laser metal cutting, torch cutting, welding, grinding, or planar finishing), and portable equipment used to process building materials (grinding and cutting equipment for stone or tile).

2.2 The devices must be maintained so that there is no degradation in air separator efficiency or the requirements of section 3 below. Filtration media should be checked daily to ensure there is no excessive build-up of waste materials, and waste material removal shall be done in a manner that minimizes the release and dispersion of dust within the facility. The removed waste material shall be contained in a closable waste receptacle to reduce the potential for fire or deflagration.

2.3 Portable or integrated devices are not allowed when their exhaust does not meet the discharge requirements in section 8 (Exhaust Systems) of this City Specification.

3. GENERAL MAINTENANCE AND HOUSEKEEPING

3.1 Equipment used for the containment of dust must be maintained in a manner that minimizes the escape of dust. Inspection, testing, and maintenance program shall be implemented to ensure that all process controls and required fire protection systems are maintained in proper operating condition. This shall include:

- Fire and deflagration control equipment
- Dust control equipment including inspection, cleaning, and maintenance of interior surfaces of dust collection equipment, air separation equipment, and air movement devices
- Integration of changes to dust collection, air separation, and other equipment to prevent degradation of dust collection system performance
- General housekeeping to prevent accumulation of dust on surfaces
- Control of potential ignition source in dust generation and accumulation areas
- Proper management of accumulated dust to prevent excessive build-up in the collection system and in/on filtration devices

3.2 A lockout/blockout program shall be in place prior to performing maintenance activities on a dust control system or any piece of equipment within the system.

3.3 Walls, floors, ceilings, flat surfaces, and fire control systems must be maintained to reduce the accumulation of fugitive combustible dusts and particulate material. Facilities are required to develop a housekeeping protocol to ensure that fugitive dust build-up is removed from all surfaces on a timely basis, depending on the type and volume of material being processed.

3.4 Surfaces shall be cleaned in a manner that minimizes the creation of dust clouds. Vigorous sweeping or blowing down with compressed air shall only be allowed when the areas of concern have been previously cleaned, and when electrical

equipment or hot surfaces and flames have been shut down and/or cooled below the dust's ignition temperature in the area that could create a fire hazard when exposed to dust.

3.5 Ignition sources shall be eliminated from the immediate area of dust producing operations. These include electrical equipment not constructed to the building area's code requirements, open flames, spark-producing equipment, incompatible materials, and sources of static electricity, smoking, or powered industrial trucks not rated for use in combustible environments. The Fire Code Official or designee can require posting of signs at conspicuous locations in the dust producing or collection areas prohibiting these activities.

3.6 All systems and system components shall be conductive, grounded, and bonded to reduce the possibility of static electric discharge. This includes use of conductive belts, conductive joints and waste accumulation containers, with the exceptions listed in section 5 (Ductwork) and section 7 (Air Separation Devices) of this City Specification.

4. GENERAL SYSTEM FABRICATION AND LOCATION

4.1 Dust collection equipment shall be made of non-combustible materials, with the exception of filter media used to separate dusts and particulates from the airstream.

4.2 The system shall be constructed of conductive materials and shall be bonded and grounded unless an engineering analysis demonstrates there will be no electrical build-up from the materials conveyed, and/or other ignition reduction methods are used that are approved by the Fire Code Official or designee.

4.3 All parts of the system (ductwork, air separators, and booths) shall be equipped with access ports to allow for inspection, cleaning and general maintenance.

4.4 Dust collection systems and generating processes shall be located in detached, segregated, or separated locations away from other occupancies to minimize damage from a fire, deflagration or explosion. Separation can be achieved by physical barriers able to withstand a deflagration, or by distance to where dust is not allowed to accumulate to a depth of more than 1/32 inch, or where airborne dust will not achieve either an MEC or a hazardous concentration.

5. DUCTWORK

5.1 Equipment (machinery and air separation devices) shall be configured so that ductwork will be as reasonably short as possible, with a minimum number of directional changes in ductwork diameter.

5.2 Changes in duct sizing are allowed provided they are of a tapered design of no more than 30% and they are designed to minimize the accumulation of particulate materials.

5.3 Flexible connections between sections of ductwork are allowed provided they are grounded and bonded. Flexible ducts without grounding are allowed at collection

points where dusts enter the dust collection system and shall be kept as short as possible to service the immediate area where it is located.

5.4 Any changes to the ductwork (addition or removal of manifolds, new branch ducts, abort gates, dampeners, etc.) shall require an engineering analysis to determine that the remaining portions of the system still have sufficient capacity and air velocity for their intended function, and the entire dust collection system performance will not be degraded.

6. AIRFLOW

6.1 Airflow in the system shall be maintained at sufficient velocity to keep ductwork and air separation devices clean and free of residues, and prevent build-up of material.

6.2 If gases other than air are used for conveying particulates through the dust collection system, they must be compatible with the system's components and the particulate material being conveyed in the system.

7. AIR SEPARATION AND DUST COLLECTION DEVICES

7.1 Except for filtration media, air separators must be constructed of conductive materials that are non-combustible, and be bonded and grounded.

7.2 In general, air separators shall be located on the exterior of buildings except if:

- Material being collected in the separator is not considered explosive
- Separator is equipped with a fire suppression system
- Equipped with deflagration venting that vents to the building's exterior
- Dust collected in the system is removed on a daily basis
- Separated from other separators by at least 20 feet

7.3 Alternative types of filtration media shall not be used unless an engineering analysis has been performed, or the dust collector's manufacturer has approved the alternative media to provide dust control and fire protection at least as effective as the original media.

7.4 Electrostatic filtration media are not allowed for metal dusts or any particulate material considered flammable.

7.5 In general, blowers used for conveying dust-laden air into a separation device shall be located on the clean-air side of the collector (downstream). Blowers may be located on the upstream side of the dust collection system if engineering analysis determines it to be more effective in material transport and overall system operation, and will not contribute to an increased fire hazard or deterioration of system performance.

8. EXHAUST SYSTEMS

8.1 Air separators are not allowed to be exhausted into a building's interior except under the following conditions:

- If the air is directly re-circulated back to the dust conveying system;
- If the capture efficiency is 99.9% for 10um particulates and the materials or re-circulated air will not increase the potential for deflagration;
- If the exhaust is from a portable or integrated dust collection device as described in section 2 (Portable or Integrated Dust Collection Devices) of this City Specification.

8.2 Recirculation is not allowed for woodworking air separators or dry-type metal particle dust collectors, with the exception of mobile dust collectors described earlier in this City Specification.

8.3 Recirculation is not allowed when combustible or toxic gases, or toxic materials, are involved in the conveyance process, or the interaction of particulates and conveying gas(es) create a flammable atmosphere, or reduces the oxygen concentration to less than 19.5%.

9. INTERLOCKS

Power to a dust collection system shall be interlocked with the airflow devices from the exhaust blower to ensure that improper functioning of the dust collection system will shut down the equipment.

10. FIRE PROTECTION SYSTEMS

10.1 Portable fire extinguisher requirements can be found in *City Specification #424, Minimum Requirements for Portable Fire Extinguishers*. The Fire Code Official or designee may require specialized portable "D" type fire extinguishers in areas where metal dust is generated, and/or areas where metal dust is accumulated.

10.2 Fire protection systems installed in dust collection and air separation equipment shall be specifically designed to address building protection, process equipment, and the chemical and physical properties of the material(s) being processed.

10.3 Extinguishing agents shall be compatible with the air conveyance and air separator's construction materials, and with the dust materials conveyed in the system.

10.4 Where fire detection systems are installed, they shall be designed to incorporate safe interlocking requirements for air movement, deflection, and process operation control. This shall include feed system shutdown, diversion of material flows, abort gates and dampeners, and continued operation of fire sensors and extinguishing systems.

11. CHANGES IN TYPE OF PARTICULATE MATERIAL COLLECTED

11.1 Dust collection systems may be used for the collection of different types of materials at the same time provided that the materials are compatible with each other, they do not react with the dust collection system's construction materials (either individually or in combination), the new material is able to be transported through the system based on current airflow characteristics, the addition of new materials will not degrade dust collection system performance, and the new material is compatible with any fire protection systems installed on, in, or around the dust collection system.

EXAMPLE: Prohibited combinations include hot metal grinding fines in woodworking operations, incompatible metal dusts, (aluminum and steels), and dusts that can react with the ductwork or other parts of the conveyance and filtration system.

11.2 When the dust collection system is to be used for a different type of material that is incompatible with the previously transported material, the system must be cleaned of all residues of the previously conveyed material.

11.3 The Fire Code Official or designee may require an engineering analysis or collection system manufacturer's approval of material compatibility prior to a change in, or addition to, the type of material conveyed in the dust collection system.

12. REQUIRED IDENTIFICATION SIGNS

12.1 A National Fire Protection Association (NFPA) placard may be required on larger systems to designate the system's hazards. These are typically required on larger air separation devices, large ductwork, and on accumulation containers at the base of an air separation device. See *City Specification #423, Hazardous Materials Identification Guide – Placarding, Labeling and Sign Requirements.*

12.2 Air separation and collection devices used to accumulate explosive dusts shall be posted with a sign that reads as follows:

CAUTION:
This dust collector can contain explosible dust.
Keep outside of the marked area while equipment is operating.

12.3 Grinders, buffers, and associated equipment with dust collectors utilized for processing metal dusts shall be provided with a placard that reads as follows:

CAUTION:
[TYPE of METAL]
Fire or Explosion Can Result When Mixed with Other Metals

12.4 Areas where combustible dusts are generated, accumulated, or processed shall be posted with signs prohibiting smoking, sources of ignition, use of personal protective equipment, or restricted entry.

12.5 The Fire Code Official or designee may require signs prohibiting smoking, open flames, hot surfaces, or other potential ignition sources, and warning signs requiring the maintenance of separation devices (warnings to keep doors closed, prohibiting ventilation obstructions, prohibiting storage in certain areas, etc).

13. WASTE MANAGEMENT

13.1 Waste dust and debris accumulated in air separation equipment, or in processing area where fugitive dusts accumulate, shall be removed on a timely basis and contained to prevent exposure to incompatible materials. Removal shall be at least once each day, unless a different interval (longer or shorter) is warranted by the volume and type of material being collected.

13.2 Wastes removed from dust collection equipment shall be stored to prevent exposure to:

- Water for water reactive materials
- Sparks, flames or other heat sources
- Corrosive materials
- Other materials incompatible with the accumulated wastes

13.3 Waste dust accumulation containers shall be made of non-combustible, conductive material. Accumulation containers made of other materials are acceptable if the waste material being accumulated is not compatible with a non-combustible, conductive container.

EXAMPLES: Waste materials that are corrosive or considered wet and would corrode a metal container.

APPROVED: Original Signed DATE: November 4, 2011
Patrick McIntosh, Fire Chief