**Chapter 43 Spraying, Dipping, and Coating Using Flammable or Combustible Materials**

43.1 Application

43.1.1\*

Operations involving the spray application of flammable and combustible materials shall comply with NFPA 33 and Section 43.1.

43.1.1.1\*

Section 43.1 shall apply to the spray application of flammable or combustible materials, as herein defined, either continuously or intermittently by any of the following methods:

Compressed air atomization

Airless or hydraulic atomization

Electrostatic application methods

Other means of atomized application

[33:1.1.1]

43.1.1.2

Section 43.1 shall also apply to the application of flammable or combustible materials, as herein defined, either continuously or intermittently by any of the following methods:

Fluidized bed application methods

Electrostatic fluidized bed application methods

Other means of fluidized application

[33:1.1.2]

43.1.1.3

Section 43.1 shall also apply to spray application of water-borne, water-based, and water-reducible materials that contain flammable or combustible liquids or that produce combustible deposits or residues. [33:1.1.3]

43.1.1.4

Section 43.1 shall apply to spray application processes or operations that are conducted indoors or outdoors within temporary membrane enclosures. [33:1.1.5]

43.1.1.5

Section 43.1 shall not apply to the following:

\* Spray operations that use less than 1 L (33.8 fl oz) of flammable or combustible liquid in any 8-hour period [33:1.1.4]

\* Spray application processes or operations that are conducted outdoors [33:1.1.6]

\* Portable spraying equipment that is not used repeatedly in the same location [33:1.1.7]

Use of aerosol products in containers up to and including 1 L (33.8 oz) capacity that are not used repeatedly in the same location [33:1.1.8]

Spray application of noncombustible materials [33:1.1.9]

The hazards of toxicity or to industrial health and hygiene [33:1.1.10]

43.1.1.6 Permits

Permits, where required, shall comply with Section 1.12.

43.1.2 General Requirements

43.1.2.1\* Location of Spray Application Operations

Spray application operations and processes shall be located in industrial occupancies as defined by NFPA 5000 and shall be confined to spray booths, spray rooms, spray areas, or in temporary membrane enclosures as defined in this Code. [33:4.1]

43.1.2.2 Locations in Other Occupancies

Spray application operations and processes shall not be conducted in any building that is classified as an assembly, an educational, a day care, a health care, an ambulatory health care, a detention/correctional, a residential, a mercantile, a business, or a storage occupancy, unless the following requirements are met:

The spraying is located in a room that is separated both vertically and horizontally from all surrounding areas by construction having a fire resistance rating of not less than 2 hours or in a spray room (see Section 5.2 of NFPA 33).

The room is protected by an approved automatic sprinkler system designed and installed in accordance with Section 13.3.

[33:4.1.1]

43.1.2.3\* Separation

Spray application operations shall be separated from other operations, materials, or occupancies by location, fire barrier walls, and horizontal assemblies in accordance with NFPA 5000, or other means acceptable to the authority having jurisdiction. [33:4.2]

43.1.3 Construction and Design of Spray Areas, Spray Rooms, and Spray Booths

43.1.3.1\* Spray Areas

43.1.3.1.1

Walls, doors, and ceilings that intersect or enclose a spray area shall be constructed of noncombusdble or limited-combustible materials or assemblies and shall be securely and rigidly mounted or fastened. The interior surfaces of the spray area shall be smooth, designed and installed to prevent pockets that can trap residues, and designed to facilitate ventilation and cleaning. [33:5.1.1]

43.1.3.1.1.1

The interior surfaces of the spray area shall be smooth, designed and installed to prevent pockets that can trap residues, and designed to facilitate ventilation and cleaning. [33:5.1.1.1]

43.1.3.1.1.2

Air intake filters that are a part of a wall or ceiling assembly shall be listed in accordance with UL 900, Air Filter Units. [33:5.1.1.2]

43.1.3.1.2

The floor of the spray area shall be constructed of noncombustible material, limited-combustible material, or combustible material that is completely covered by noncombustible material. [33:5.1.2]

43.1.3.1.3

Aluminum shall not be used for structural support members, walls, or ceilings that enclose a spray area or for ventilation ductwork to or from an enclosed spray area unless otherwise permitted by 43.1.3.1.3.1. [33:5.1.3]

43.1.3.1.3.1

Aluminum shall be permitted to be used for interior components, such as platforms, spray apparatus components, and other ancillary devices. [33:5.1.3.1]

43.1.3.1.4

Enclosed spray areas shall be provided with means of egress that meet the applicable requirements of Chapter 40 of NFPA 101. [33:5.1.4]

43.1.3.2 Spray Rooms

In addition to the requirements of 43.1.3.1, spray rooms shall be constructed of and separated vertically and horizontally from all surrounding areas by construction assemblies that have a fire resistance rating of not less than 2 hours. [33:5.2]

43.1.3.3 Spray Booths

43.1.3.3.1

Spray booths shall meet the requirements of 43.1.3.1 and 43.1.3.3. [33:5.3.1]

43.1.3.3.2

If walls or ceiling assemblies are constructed of sheet metal, single-skin assemblies shall be no thinner than 0.0478 in. (1.2 mm), and each sheet of double-skin assemblies shall be no thinner than 0.0359 in. (0.9 mm). [33:5.3.2]

43.1.3.3.3

Structural sections of spray booths shall be permitted to be sealed with a caulk or sealant to minimize air leakage. [33:5.3.3]

43.1.3.3.4

Spray booths that are used exclusively for powder coating shall meet the requirements of Chapter 15 of NFPA 33 and shall be permitted to be constructed of fire-retardant combustible materials where approved by the AHT. [33:5.3.4]

43.1.3.3.4.1

Listed spray booth assemblies that are constructed of other materials shall be permitted. [33:5.3.4.1]

43.1.3.3.5

Spray application operations and processes that involve the use of finishing materials containing nitrocellulose shall be confined to water-wash spray booths as defined in NFPA 33 unless otherwise specified in 43.1.3.3.5.1. [33:5.3.5]

43.1.3.3.5.1

Spray application of finishing materials containing nitrocellulose shall be permitted in a dry-type spray booth provided that residue is removed from all baffle plates at least daily and all filters are changed at least daily. [33:5.3.5.1]

43.1.3.4 Conveyor Openings

Conveyor openings that are necessary for transporting or moving work into and out of the spray area shall be as small as practical. [33:5.4]

43.1.3.5\* Separation From Other Occupancies

Spray booths shall be separated from other operations by a minimum distance of 3 ft (915 mm) or by a partition, wall, or floor/ceiling assembly having a minimum fire resistance rating of 1 hour; multiple connected spray booths shall not be considered as "other operations" except as provided for in Section 13.3 of NFPA 33. [33:5.5]

43.1.3.5.1

Spray booths shall be installed so that all parts of the booth are readily accessible for cleaning. [33:5.5.1]

43.1.3.5.2

A clear space of not less than 3 ft (915 mm) shall be maintained on all sides and above the spray booth, and shall be kept free of any storage or combustible construction. [33:5.5.2]

43.1.3.5.2.1

The requirement in 43.1.3.5.2 shall not prohibit locating a spray booth closer than 3 ft (915 mm) to or directly against an interior partition, wall, or floor/ceiling assembly that has a fire resistance rating of not less than 1 hour, provided the spray booth can be maintained and cleaned. [33:5.5.2.1]

43.1.3.5.2.2

The requirement in 43.1.3.5.2 shall not prohibit locating a spray booth closer than 3 ft (915 mm) to an exterior wall or a roof assembly, provided the wall or roof is constructed of noncombustible material and provided the spray booth can be maintained and cleaned. [33:5.5.2.2]

43.1.3.6 Illumination and Observation Panels

43.1.3.6.1

Panels for luminaires or observation shall be of heat-treated glass, laminated glass, wired glass, or hammered-wired glass and shall be sealed to confine vapors, mists, residues, dusts, and deposits to the spray area. [33:5.6.1]

43.1.3.6.1.1

Listed spray booth assemblies that have observation panels constructed of other materials shall be permitted. [33:5.6.1.1]]

43.1.3.6.2

Panels for luminaires shall be separated from the fixture to prevent the surface temperature of the panel from exceeding 200°F (93°C). [33:5.6.2]

43.1.3.6.3

The panel frame and method of attachment shall be designed to not fail under fire exposure before the observation panel fails. [33:5.6.3]

43.1.3.6.4

Observation panels for spray booths that are used exclusively for powder coating processes shall be permitted to be constructed of fire-resistant combustible materials. [33:5.6.4]

43.1.3.7 Ventilation

Spray areas that are equipped with ventilation distribution, baffle plates, or dry overspray collection filters shall meet the requirements of 43.1.3.7.1 through 43.1.3.7.5. [33:5.7]

43.1.3.7.1

Distribution plates or baffles shall be constructed of noncombustible materials and shall be readily removable or accessible for cleaning on both sides. [33:5.7.1]

43.1.3.7.2

Filters shall not be used when applying materials known to be highly susceptible to spontaneous heating or spontaneous ignition. [33:5.7.2]

43.1.3.7.3

Supports and holders for filters shall be constructed of noncombustible materials. [33:5.7.3]

43.1.3.7.4

Overspray collection filters shall be readily removable or accessible for cleaning or replacement. [33:5.7.4]

43.1.3.7.5

Filters shall not be alternately used for different types of coating materials if the combination of the materials might result in spontaneous heating or ignition. (See also Section 10.9 of NFPA 33.) [33:5.7.5]

43.1.4 Electrical and Other Sources of Ignition

43.1.4.1\* General

43.1.4.1.1

Electrical wiring and utilization equipment shall meet all applicable requirements of Articles 500, 501, 502, 505, and 516 of NFPA 70 and all applicable requirements of this chapter. [33:6.2.1]

43.1.4.1.1.1

Powered vehicles shall meet the requirements of 43.1.4.9. [33:6.2.1.1]

43.1.4.1.1.2

Resin application operations shall meet the requirements of Chapter 17 of NFPA 33. [33:6.2.1.2]

43.1.4.1.2\*

For the purposes of this Code, the Zone system of electrical area classification shall be applied as follows:

The inside of open or closed containers or vessels shall be considered a Class I, Zone 0 location.

A Class I, Division 1 location shall be permitted to be alternatively classified as a Class I, Zone 1 location.

A Class I, Division 2 location shall be permitted to be alternatively classified as a Class I, Zone 2 location.

A Class II, Division 1 location shall be permitted to be alternatively classified as a Zone 21 location.

A Class II, Division 2 location shall be permitted to be alternatively classified as a Zone 22 location.

[33:6.2.2]

43.1.4.1.3

For the purposes of electrical area classification, the Division system and the Zone system shall not be intermixed for any given source of release. [33:6.2.3]

43.1.4.1.4

In instances of areas within the same facility classified separately, Class I, Zone 2 locations shall be permitted to abut, but not overlap, Class I, Division 2 locations. Class I, Zone 0 or Zone 1 locations shall not abut Class I, Division 1 or Division 2 locations. [70:505.7(B)]

43.1.4.1.5\*

Open flames, spark-producing equipment or processes, and equipment whose exposed surfaces exceed the autoignition temperature of the material being sprayed shall not be located in a spray area or in any surrounding area that is classified as Division 2, Zone 2, or Zone 22. [33:6.2.5]

43.1.4.1.5.1

This requirement shall not apply to drying, curing, or fusing apparatus covered by Section 43.4. [33:6.2.5.1]

43.1.4.1.6\*

Any utilization equipment or apparatus that is capable of producing sparks or particles of hot metal and that is located above or adjacent to either the spray area or the surrounding Division 2, Zone 2, or Zone 22 areas shall be of the totally enclosed type or shall be constructed to prevent the escape of sparks or particles of hot metal. [33:6.2,6]

43.1.4.2 Electrical Area Classification

43.1.4.2.1\* Class I Locations

A Class I location shall be any location where a flammable gas or vapor is present or might be present in the air in quantities sufficient to produce an explosive or ignitible mixture. [33:6.3.1]

43.1.4.2.1.1\* Class I, Division 1 Locations

As defined in 500.5(B)(1) of NFPA 70, a Class I, Division 1 location shall be any location where one of the following conditions exists:

An ignitible concentration of flammable gas or vapor can exist under normal operating conditions.

An ignitible concentration of flammable gas or vapor can exist frequently because of repair or maintenance operations or because of leakage.

Breakdown or faulty operation of equipment or processes might release an ignitible concentration of flammable gas or vapor and might also cause simultaneous failure of electrical equipment in such a way as to directly cause the electrical equipment to become a source of ignition.

[33:6.3.1.1]

43.1.4.2.1.2\* Class I, Division 2 Locations

As defined in 500.5(B)(2) of NFPA 70, a Class I, Division 2 location shall be any location where one of the following conditions exists:

A flammable gas or a volatile flammable liquid is handled, processed, or used, but any flammable gas, vapor, or liquid is confined within a closed container or a closed system from which it can escape only in case of accidental rupture or breakdown of the container or system or in case of abnormal operation of the equipment.

An ignitible concentration of flammable gas or vapor is normally prevented by positive mechanical ventilation but might exist because of failure or abnormal operation of the ventilating equipment.

An ignitible concentration of flammable gas or vapor might occasionally be transmitted from an adjacent Class I, Division 1 location, unless such transmission is prevented by positive pressure ventilation from a source of clean air and effective safeguards against ventilation failure are provided.

[33:6.3.1.2]

43.1.4.2.1.3\* Class I, Zone 0 Locations

As defined in 505.5(B) (1) of NFPA 70, a Class I, Zone 0 location shall be any location where an ignitible concentration of flammable gas or vapor is present either continuously or for long periods of time. [33:6.3.1.3]

43.1.4.2.1.4\* Class I, Zone 1 Locations

As defined in 505.5(B)(2) of NFPA 70, a Class I, Zone 1 location shall be any location where one of the following conditions exists:

An ignitible concentration of flammable gas or vapor is likely to exist under normal operating conditions.

An ignitible concentration of flammable gas or vapor might exist frequently because of repair or maintenance operations or because of leakage.

Breakdown or faulty operation of equipment or processes might release an ignitible concentration of flammable gas or vapor and might also cause simultaneous failure of electrical equipment in such a way as to directly cause the electrical equipment to become a source of ignition.

An ignitible concentration of flammable gas or vapor might occasionally be transmitted from an adjacent Class I, Zone 0 location, unless such transmission is prevented by positive pressure ventilation from a source of clean air and effective safeguards against ventilation failure are provided.

[33:6.3.1.4]

43.1.4.2.1.5 Class I, Zone 2 Locations

As defined in 505.5(B) (3) of NFPA 70, a Class I, Zone 2 location shall be any location where one of the following conditions exists:

An ignitible concentration of a flammable gas or vapor is not likely to exist under normal operating conditions, and if an ignitible concentration does exist, will exist only for a short period of time.

A flammable gas or a volatile flammable liquid is handled, processed, or used, but any flammable gas, vapor, or liquid is confined within a closed container or a closed system from which it can escape only in case of accidental rupture or breakdown of the container or system or in case of abnormal operation of the equipment.

An ignitible concentration of flammable gas or vapor is normally prevented by positive mechanical ventilation but might exist because of failure or abnormal operation of the ventilating equipment.

An ignitible concentration of flammable gas or vapor might occasionally be transmitted from an adjacent Class I, Zone 1 location, unless such transmission is prevented by positive pressure ventilation from a source of clean air and effective safeguards against ventilation failure are provided. (See also A.43.1.4.2.1.2.)

[33:6.3.1.5]

43.1.4.2.2 Class II Locations

A Class II location shall be any location that might be hazardous because of the presence of a combustible dust. [33:6.3.2]

43.1.4.2.2.1\* Class II, Division 1 Locations

As defined in 500.5(C)(1) of NFPA 70, a Class II, Division 1 location shall be any location where one of the following conditions exists:

Combustible dust is in the air in quantities sufficient to produce explosive or ignitible mixtures under normal operating conditions.

Mechanical failure or abnormal operation of machinery or equipment might cause an explosive or ignitible mixture of combustible dust in air and might also provide a source of ignition through simultaneous failure of electrical equipment, operation of protection devices, or from other causes.

Group E combustible dusts might be present in quantities sufficient to be hazardous.

[33:6.3.2.1]

43.1.4.2.2.2\* Class II, Division 2 Locations

As defined in 500.5(C)(2) of NFPA 70, a Class II, Division 2 location shall be any location where one of the following conditions exists:

Combustible dust due to abnormal operations might be present in the air in quantities sufficient to produce explosive or ignitible mixtures.

Combustible dust accumulations are present but are normally insufficient to interfere with the normal operation of electrical equipment or other apparatus, but could as a result of infrequent malfunctioning of handling or processing equipment become suspended in the air.

Combustible dust accumulations on, in, or in the vicinity of the electrical equipment could be sufficient to interfere with the safe dissipation of heat from electrical equipment, or could be ignitible by abnormal operation or failure of electrical equipment.

[33:6.3.2.2]

43.1.4.2.2.3\* Zone 20

As defined in 506.5(B)(1) of NFPA 70, a Zone 20 location shall be any location where one of the following conditions exists:

An ignitible concentration of combustible dust is present continuously.

An ignitible concentration of combustible dust is present for long periods of time.

[33:6.3.2.3]

43.1.4.2.2.4\* Zone 21

As defined in 506.5(B)(2) of NFPA 70, a Zone 21 location shall be any location where one of the following conditions exists:

An ignitible concentration of combustible dust is likely to exist occasionally under normal operating conditions.

An ignitible concentration of combustible dust might exist frequently because of repair or maintenance operations or because of leakage.

Equipment is operated or processes are carried on of such a nature that equipment breakdown or faulty operations could result in the release of an ignitible concentration of combustible dust and also cause simultaneous failure of electrical equipment in a mode to cause the electrical equipment to become a source of ignition.

An ignitible concentration of combustible dust could be communicated from an adjacent Zone 20 location, unless communication is prevented by adequate positive pressure ventilation from a source of clean air and effective safeguards against ventilation failure are provided.

[33:6.3.2.4]

43.1.4.2.2.5\* Zone 22

As defined in 506.5(B)(3) of NFPA 70, a Zone 22 location shall be any location where one of the following conditions exists:

An ignitible concentration of combustible dust is not likely to occur in normal operation, and if it does occur, will only persist for a short period.

A combustible dust is handled, processed, or used, but the dust is normally confined within closed containers or closed systems from which it can escape only as a result of the abnormal operation of the equipment with which the dust is handled, processed, or used.

An ignitible concentration of combustible dust could be communicated from an adjacent Zone 21 location, unless communication is prevented by adequate positive pressure ventilation from a source of clean air and effective safeguards against ventilation failure are provided.

[33:6.3.2.5]

43.1.4.3 Electrical Devices in Spray Areas

43.1.4.3.1

The spray area as defined in 3.3.14.12 shall be Class I, Division 1; Class I, Zone 1; Class II, Division 1; or Zone 21, whichever is applicable. [33:6.4.1]

43.1.4.3.2

Electrical wiring and utilization equipment that is located in the spray area and is not subject to deposits of combustible residues shall be suitable for Class I, Division 1; Class I, Zone 1; Class II, Division 1; or Zone 21 locations, whichever is applicable. [33:6.4.2]

43.1.4.3.3\*

Electrical wiring and utilization equipment that is located in the spray area and is subject to deposits of combustible residues shall be listed for such exposure and shall be suitable for Class I, Division 1; Class I, Zone 1; Class II, Division 1; or Zone 21 locations, whichever is applicable. [33:6.4.3]

43.1.4.4 Electrical Devices in Areas Adjacent to or Connected to Spray Areas

Electrical wiring and utilization equipment located in areas adjacent to or connected to the spray area, including but not limited to vestibules and tunnels, shall be classified in accordance with 43.1.4.4.1 through 43.1.4.4.5. [33:6.5]

43.1.4.4.1

Electrical wiring and utilization equipment located outside, but within 20 ft (6100 mm) horizontally and 10 ft (3050 mm) vertically, of an unenclosed spray area and not separated from the spray area by partitions extending to the boundaries of the area designated as Division 2, Zone 2; or Zone 22 in Figure 43.1.4.4.1 shall be suitable for Class I, Division 2; Class I, Zone 2; Class II, Division 2; or Zone 22 locations, whichever is applicable. [33:6.5.1]

FIGURE 43.1.4.4.1 Electrical Area Classification for Unenclosed Spray Areas. [33:Figure 6.5.1]

43.1.4.4.2

If spray application operations are conducted within a closed-top, open-face or open-front booth or room, as shown in Figure 43.1.4.4.2(a) or Figure 43.1.4.4.2(b), any electrical wiring or utilization equipment located outside the booth or room but within 3 ft (915 mm) of any opening shall be suitable for Class I, Division 2; Class I, Zone 2; Class II, Division 2; or Zone 22 locations, whichever is applicable. [33:6.5.2]

FIGURE 43.1.4.4.2(a) Class I, Division 2; Class I, Zone 2; Class II, Division 2; or Zone 22 Locations Adjacent to an Open-Face or Open-Front Spray Booth or Spray Room. [33:Figure 6.5.2(a)]

FIGURE 43.1.4.4.2(b) Class II, Division 1; or Zone 21 Locations Inside Powder Coating Booth and On the Manual Spray Platforms. Class II, Division 2; or Zone 22 Locations Adjacent to Automatic Gun Openings and Outer Edge of the Manual Spray Platform for Powder Coating Booth. [33:Figure 6.5.2(b)]

43.1.4.4.3

If spray application operations are conducted within an open-top booth, any electrical wiring or utilization equipment located within the space 3 ft (915 mm) vertically from the top of the booth shall be suitable for Class I, Division 2; Class I, Zone 2; Class II, Division 2; or Zone 22 locations, whichever is applicable. In addition, any electrical wiring or utilization equipment located within 3 ft (915 mm) in all directions of openings other than the open top also shall be suitable for Class I, Division 2; Class I, Zone 2; Class II, Division 2; or Zone 22 locations, whichever is applicable. [33:6.5.3]

43.1.4.4.4

If spray application operations are confined to an enclosed spray booth or room, electrical area classification shall be as follows:

The area within 3 ft (915 mm) of any opening shall be classified as Class I, Division 2; Class I, Zone 2; Class II, Division 2; or Zone 22 locations, whichever is applicable, as shown in Figure 43.1.4.4.4.

\* Where automated spray application equipment is used, the area outside the access doors shall be unclassified provided the door interlock prevents the spray application operations when the door is open.

Where exhaust air is recirculated and all requirements of 43.1.5.5 are met, both of the following shall apply:

The interior of any recirculation path downstream of the recirculation particulate filter up to and including the air supply plenum shall be classified as Class I, Division 2; Class I, Zone 2; Class II, Division 2; or Zone 22 locations, whichever is applicable.

The interior of fresh air supply ducts shall be unclassified.

Where exhaust air is not recirculated, the interior of fresh air supply ducts and fresh air supply plenums shall be unclassified.

[33:6.5.4]

FIGURE 43.1.4.4.4 Class I, Division 2; Class I, Zone 2; Class II, Division 2; or Zone 22 Locations Adjacent to an Enclosed Spray Booth or Spray Room. [33:Figure 6.5.4]

43.1.4.4.5\*

Open containers, supply containers, waste containers, spray gun cleaners, and solvent distillation units that contain Class I liquids shall be located in areas ventilated in accordance with applicable requirements of 43.1.5. [33:6.5.5]

43.1.4.4.5.1

Electrical area classification shall be as follows:

The area within 3 ft (915 mm) in all directions from any such container or equipment and extending to the floor or grade level shall be classified as Class I, Division 1 or Class I, Zone 1, whichever is applicable.

The area extending 2 ft (610 mm) beyond the Division 1 or Zone 1 location shall be classified as Class I, Division 2 or Class I, Zone 2, whichever is applicable.

The area extending 5 ft (1525 mm) horizontally beyond the area described in 43.1.4.4.5.1(2) up to a height of 18 in. (460 mm) above the floor or grade level shall be classified as Class I, Division 2 or Class I, Zone 2, whichever is applicable.

The area inside any tank or container shall be classified as Class I, Division 1 or Class I, Zone 0, whichever is applicable. [33:6.5.5.1]

43.1.4.4.5.2

Electrical wiring and utilization equipment installed in these areas shall be suitable for the location, as shown in Figure 43.1.4.4.5.2. [33:6.5.5.2]

FIGURE 43.1.4.4.5.2 Electrical Area Classification for Class I Liquid Operations Around Open Containers, Supply Containers, Waste Containers, Spray Gun Cleaners, and Solvent Distillation Units. [33:Figure 6.5.5.2]

43.1.4.5 Illumination

43.1.4.5.1

Luminaires, like that shown in Figure 43.1.4.5.1, that are attached to the walls or ceiling of a spray area but that are outside any classified area and are separated from the spray area by glass panels that meet the requirements of 43.1.3.6 shall be suitable for use in unclassified locations. Such fixtures shall be serviced from outside the spray area. [33:6.6.1]

FIGURE 43.1.4.5.1 Example of a Luminaire Mounted Outside the Spray Area and Serviced from Outside the Spray Area. [33:Figure 6.6.1]

43.1.4.5.2

Luminaires, like that shown in Figure 43.1.4.5.1, that are attached to the walls or ceiling of a spray area; that are separated from the spray area by glass panels that meet the requirements of 43.1.3.6; and that are located within a Class I, Division 2: a Class I, Zone 2; a Class II, Division 2; or a Zone 22 location shall be suitable for such location. Such fixtures shall be serviced from outside the spray area. [33:6.6.2]

43.1.4.5.3

Luminaires, like that shown in Figure 43.1.4.5.3, that are an integral part of the walls or ceiling of a spray area shall be permitted to be separated from the spray area by glass panels that are an integral part of the fixture. Such fixtures shall be listed for use in Class I, Division 2; Class I, Zone 2; Class II, Division 2; or Zone 22 locations, whichever is applicable, and also shall be listed for accumulations of deposits of combustible residues. Such fixtures shall be permitted to be serviced from inside the spray area. [33:6.6.3]

FIGURE 43.1.4.5.3 Examples of Luminaires That Are Integral Parts of the Spray Area and That Are Serviced from Inside the Spray Area. [33:Figure 6.6.3]

43.1.4.5.4

Luminaires that are located inside the spray area shall meet the requirements of 43.1.4.3 and 43.1.4.6. [33:6.6.4]

43.1.4.6\* Static Electricity

All electrically conductive objects in the spray area, except those objects required by the process to be at high voltage, shall be electrically connected to ground with a resistance of not more than 1 megohm (106 ohms). This requirement shall apply to containers of coating material, wash cans, guards, hose connectors, brackets, and any other electrically conductive objects or devices in the area. This requirement shall also apply to any personnel who enter the spray area. [33:6.7]

43.1.4.7 Flexible Power Cords

For automated equipment and robotic equipment, flexible power cords shall be permitted to be used in hazardous (classified) locations and shall be permitted to be connected to the fixed part of the electrical circuit, provided they meet all of the following conditions:

They are approved for extra-hard usage.

They are equipped with a grounding conductor that meets the requirements of Section 400.2 of NFPA 70.

They are connected to terminals or conductors in an approved manner.

They are supported by a positive mechanical clamp in such a manner that permits the cord to be readily replaced and prevents strain at the cord connections within the terminal enclosure.

They are provided with explosionproof seals for liquid applications or dusttight seals for powder applications where the cord enters junction boxes, fittings, or enclosures.

They are listed for deposits of combustible residues. [33:6.8]

43.1.4.8 Portable Electric Luminaires

Portable electric luminaires used in spray areas shall meet the requirements of 43.1.4.3.3. [33:6.9]

43.1.4.9 Movement of Powered Vehicles

Powered vehicles shall be listed for the electrical area classification in which they are used, and unlisted powered vehicles shall not be moved into or out of a spray area or operated in a spray area unless the spray application operation or process is stopped and the ventilation system is maintained in operation. [33:6.10]

43.1.5 Ventilation

43.1.5.1 General

Ventilating and exhaust systems shall be designed and installed in accordance with the applicable requirements of NFPA 91 except as amended by the requirements of 43.1.5. [33:7.1]

43.1.5.2 Performance Requirements

Each spray area shall be provided with mechanical ventilation that is capable of confining and removing vapors and mists to a safe location and is capable of confining and controlling combustible residues, dusts, and deposits. The concentration of the vapors and mists in the exhaust stream of the ventilation system shall not exceed 25 percent of the lower flammable limit. (See Annex B of NFPA 33 for additional guidance on determining the lower flammable limit.) [33:7.2]

43.1.5.2.1\*

Spray areas equipped with overspray collection filters shall have an effective means to ensure that the performance requirements of 43.1.5.2 are met. [33:7.2.1]

43.1.5.2.2 Powder Coating Systems

Powder coating systems also shall meet the requirements of Section 15.8 of NFPA 33. [33:7.2.2]

43.1.5.2.3

Mechanical ventilation shall be kept in operation at all times while spray operations are being conducted and for a sufficient time thereafter to allow the vapors from drying coated objects or material and residues to be exhausted. Where spray operations are conducted automatically without an attendant constantly on duty, the operating controls of the spray apparatus shall be arranged so that the spray apparatus cannot function unless the exhaust fans are operating. [33:7.2.3]

43.1.5.2.4

In confined spaces, where ventilation is not capable of meeting the requirements of 43.1.5.2, an inerting procedure shall be permitted to be used. Such procedures shall meet the applicable requirements of NFPA 69 and shall be acceptable to the AHJ. [33:7.2.4]

43.1.5.3\* Make-Up Air

Clean make-up air shall be provided to compensate for the air exhausted from spray operations. The intake for this make-up air shall be located so that the air exhausted from spray operations is not recirculated. [33:7.3]

43.1.5.4 Routing of Exhaust Ducts

Air exhausted from liquid spray operations shall be conducted by ducts directly to the outside of the building. Exhaust ducts shall follow the shortest route to the point of discharge and shall meet the following conditions:

Exhaust ducts shall not penetrate a fire wall or fire barrier wall.

Exhaust discharge shall be directed away from any air intakes.

Exhaust discharge point shall be at least 6 ft (1830 mm) from any exterior wall or roof.

Exhaust discharge point shall be at least 10 ft (3048 mm) from openings into the building.

Exhaust discharge point shall be at least 10 ft (3048 mm) above adjoining grade.

Exhaust duct shall not discharge in the direction of any combustible construction that is within 25 ft (7625 mm) of the exhaust duct discharge point.

Exhaust duct shall not discharge in the direction of any unprotected opening in any noncombustible or limited-combustible construction that is within 25 ft (7625 mm) of the exhaust duct discharge point.

Exhaust duct shall not discharge in the direction of any exit discharge or public way that is within 25 ft (7625 mm) of the exhaust duct discharge point.

[33:7.4]

43.1.5.5\* Recirculation of Exhaust

Air exhausted from spray areas shall not be recirculated unless all of the following requirements are met:

Recirculation particulate filters as defined in this Code shall be used to remove particulates from the recirculated air.

The concentration of vapors in the exhaust airstream shall not exceed 25 percent of the lower flammable limit.

Listed equipment shall be used to monitor the concentration of vapors in all exhaust airstreams.

The equipment specified in 43.1.5.5(3) shall initiate a local alarm and shall automatically shut down the spray operation if the concentration of any vapor in the exhaust airstream exceeds 25 percent of the lower flammable limit.

All equipment installed to process and remove contaminants from the air exhausted from spray operations shall be approved by the AHJ.

\* For occupied spray areas where a portion of the exhaust air is recirculated within the spray area, toxicity and worker exposures shall be addressed.

[33:7.5]

43.1.5.6\* Manifolding of Exhaust Ducts

Individual spray booths shall be separately ducted to the building exterior except as indicated in 43.1.5.6.1 or 43.1.5.6.2. [33:7.7]

43.1.5.6.1

Multiple cabinet spray booths whose combined frontal area does not exceed 18 ft2 (1.7 m2) shall be permitted to be manifolded if the sprayed materials used will not react and cause ignition of the residue in the ducts. [33:7.7.1]

43.1.5.6.2

Where treatment of exhaust is necessary for air pollution control or for energy conservation, ducts shall be permitted to be manifolded if all of the following conditions are met:

The sprayed materials used will not react and cause ignition of the residue in the ducts.

No finishing materials containing nitrocellulose are used.

An air-cleaning system is provided to reduce the amount of overspray carried into the duct manifold.

Automatic sprinkler protection is provided at the junction of each booth exhaust with the manifold, in addition to the protection required by 43.1.7.

The installation is approved by the AHJ. [33:7.7.2]

43.1.5.7\* Materials of Construction

Exhaust plenums and exhaust ducts and fasteners shall be constructed of steel, except as allowed in 43.1.5.7.1, 43.1.5.7.2, and 43.1.5.7.3. [33:7.8]

43.1.5.7.1

For spray booths used exclusively for powder coating, ducts shall be permitted to be constructed of fire-retardant combustible materials. [33:7.8.1]

43.1.5.7.2

Concrete shall be permitted to be used. The interior surfaces of the concrete exhaust plenum or exhaust duct shall be smooth and sealed to facilitate cleaning. [33:7.8.2]

43.1.5.7.3

Other materials of construction shall be permitted to be used in cases where the conveyed materials are not compatible with steel. [33:7.8.3]

43.1.5.8\* Support of Exhaust Ducts

Exhaust ducts shall be supported to prevent collapse under fire conditions. [33:7.9]

43.1.5.8.1

Duct supports shall be designed to carry the weight of the duct system itself, plus the anticipated weight of any residues. If sprinkler protection is provided inside the duct system, then the duct supports also shall be designed to carry the anticipated weight of any accumulation of sprinkler discharge. [33:7.9.1]

43.1.5.8.2

Hangers and supports shall be fastened to the building or to the structure to minimize vibration and stress on the duct system. [33:7.9.2]

43.1.5.8.3

Hangers and supports shall be designed to allow for expansion and contraction. [33:7.9.3]

43.1.5.8.4

Exhaust ducts shall not use building walls, floors, ceilings, or roofs as component parts. [33:7.9.4]

43.1.5.8.5

The provisions of 43.1.5.8.4 shall not disallow the use of concrete exhaust plenums or exhaust ducts where some or all of the plenum or duct is part of the concrete floor. [33:7.9.5]

43.1.5.9 Exhaust Duct Access Openings

Exhaust ducts shall be provided with doors, panels, or other means to facilitate inspection, maintenance, cleaning, and access to fire protection devices. [33:7.10]

43.1.5.10 Exhaust Fans and Drives

43.1.5.10.1

The rotating element of the exhaust fan shall be nonferrous, or the fan shall be constructed so that a shift of the impeller or shaft will not permit two ferrous parts of the fan to rub or strike. Necessary allowances shall be made for ordinary expansion and loading and to prevent contact between moving parts and the duct or fan housing. Fan blades shall be mounted on a shaft that shall maintain alignment even when the blades of the fan are heavily loaded. All bearings shall be of the self-lubricating type or shall be provided with accessible lubricating ports. [33:7.11.1]

43.1.5.10.2

Electric motors that drive exhaust fans shall not be placed inside any spray area unless they meet the provisions of 43.1.4.3.3. [33:7.11.2]

43.1.5.10.3

Belts shall not enter any spray area unless the belt and pulley within the spray area are completely enclosed. [33:7.11.3]

43.1.5.11\* Drying Areas

Freshly sprayed workpieces shall be dried only in spaces that are ventilated to prevent the concentration of vapors from exceeding 25 percent of the lower flammable limit. (See also Section 43.4.) [33:7.12]

43.1.6 Storage, Handling, and Distribution of Flammable and Combustible Liquids

43.1.6.1\* General

Storage, handling, and mixing of flammable and combustible liquids shall meet all the applicable requirements of NFPA 30 and 43.1.6. [33:8.1]

43.1.6.2 General Occupancy Limits

The maximum allowable quantities (MAQs) of ignitible (flammable or combustible) liquids allowed in each control area shall not exceed the amounts specified in Table 43.1.6.2. [30:9.6.1]

Table 43.1.6.2 MAQ of Ignitible (Flammable or Combustible) Liquids per Control Area

Liquid Classes# Quantity Notes

gal L

IA 30 115 1, 2

IB and IC

IA, IB, IC 120 460 1, 2

combined 120 460 1,2,3

II 120 460 1,2

IIIA 330 1,265 1,2

IIIB 13,200 50,600 1,2,4

\*See 66.4.1 for details on the classification scheme.

Notes:

Quantities are permitted to be increased 100 percent where stored in approved liquid storage cabinets or in safety cans in accordance with the fire code. Where Note 2 also applies, the increase for both notes is permitted to be applied accumulatively.

Quantities are permitted to be increased 100 percent in buildings equipped throughout with an automatic sprinkler system installed in accordance with NFPA 13. Where Note 1 also applies, the increase for both notes is permitted to be applied accumulatively.

Containing not more than the maximum allowable quantity per control area of Class IA, Class IB, or Class IC [FP < 100°F (37.8°C)] liquids, individually.

Quantities are not limited in a building equipped throughout with an automatic sprinkler system installed in accordance with NFPA 13 and designed in accordance with the protection criteria contained in 66.16.

Exception: As modified by 66.9.5.2 of this Code and Chapters 10 through 14 of NFPA 30.

[30:Table 9.6.1]

43.1.6.3 Mixing

43.1.6.3.1

Dispensing or transfer of liquids from containers and filling of containers, including portable mixing tanks and "pressure pots," shall be done only in a spray area with the ventilation in operation or in a mixing room. [33:8.3.1]

43.1.6.3.2

Where the quantities of liquids required or the floor area necessary to provide a suitable mixing room exceeds the limits specified in 43.1.6.3.3 through 43.1.6.3.6, the mixing room shall meet all applicable requirements of this Code and NFPA 30. [33:8.3.2]

43.1.6.3.3

Mixing rooms shall meet all of the following requirements:

Mixing rooms shall meet the construction requirements of 43.1.3.

The area of a mixing room shall not exceed 150 ft2 (14 m2).

If more than one mixing room is installed, the total quantity of liquids shall not exceed the limits in 43.1.6.3.5 or 43.1.6.3.6.

Mixing rooms shall be designed to contain a spill of the contents in the room.

Mixing rooms where dispensing, handling, or transferring of Class I, Class II, or Class III liquids at temperatures at or above their flash point occurs shall be provided with mechanical ventilation capable of providing air movement not less than 1 ft3/min/ft2 (0.3 m3/min/m2) of floor area or 150 ft3/min (4 m3/min), whichever is greater. The ventilation system shall be in operation at all times.

Ventilation systems provided in accordance with 43.1.6.3.3(5) shall be in operation during operating hours or whenever vapors are present.

Mixing rooms shall be classified for purposes of electrical area classification in accordance with Chapter 7 of NFPA 30

Mixing rooms shall be provided with an approved automatic fire protection system that meets all applicable requirements of Chapter 9 of NFPA 33.

Mixing rooms shall be provided with portable fire extinguishers located in accordance with NFPA 10.

[33:8.3.3]

43.1.6.3.4

The amount of liquid permitted in a single spray area shall not exceed 60 gal (227 L). [33:8.3.4]

43.1.6.3.5

Where a separate mixing room is provided and the mixing room is located adjacent to or within 6 ft (1830 mm) of an adjacent spray area or areas, as shown in Figure 43.1.6.3.5(a) and Figure 43.1.6.3.5(b), the combined quantities of liquids located in the spray areas and the mixing room shall not exceed 120 gal (454 L). [33:8.3.5]

Maximum volumes of liquid allowed:

Spray area, 60 gal (227 L)

Spray area and mix room, 120 gal (454 L)

FIGURE 43.1.6.3.5(a) Mixing Room Within 6 ft (1830 mm) of Spray Area, Including Maximum Volume of Liquid Allowed. [33:Figure 8.3.5(a)]

Maximum volumes of liquid allowed:

Spray area, 60 gal (227 L)

Spray area and mix room, 120 gal (454 L)

FIGURE 43.1.6.3.5(b) Mixing Room Within 6 ft (1830 mm) of Spray Area and with Direct Entry to Spray Area, Including Maximum Volume of Liquid Allowed. [33:Figure 8.3.5(b)]

43.1.6.3.6

Where a separate mixing room is provided and the mixing room is located more than 6 ft (1830 mm) from an adjacent spray area or areas, the quantity of liquid permitted in the mixing room shall not exceed 2 gal/ft2 (80 L/m2), up to a maximum of 300 gal (1135 L), as shown in Figure 43.1.6.3.6. The amount of liquid in the spray area shall not exceed 60 gal (227 L). [33:8.3.6]

Maximum volumes of liquid allowed:

Spray area, 60 gal (227 L)

Spray area and mix room, 360 gal (1362 L)

FIGURE 43.1.6.3.6 Mixing Room More Than 6 ft (1830 mm) from Spray Area, Including Maximum Volume of Liquid Allowed. [33:Figure 8.3.6]

43.1.6.4 Distribution Systems — Piping

43.1.6.4.1\*

Piping systems that convey flammable or combustible liquids between storage tanks, mixing rooms (paint kitchens), and spray areas shall be of steel or other material having comparable properties of resistance to heat and physical damage. Piping systems shall be properly bonded and grounded. [33:8.4.1]

43.1.6.4.2\*

Piping systems within the spray area shall be of steel or material having comparable heat and physical resistance where possible. Where tubing or hose is used, a shutoff valve shall be provided on the steel pipe at the connection. [33:8.4.2]

43.1.6.4.3\*

Tubing or hose shall be inspected and replaced as necessary. Replacement tubing or hose shall be that recommended by the equipment manufacturer. [33:8.4.3]

43.1.6.4.4

Where a pump is used to supply the liquid used in the spray application process, piping, tubing, hose, and other accessories shall be designed to withstand the maximum working pressure of the pump, or means shall be provided to limit the discharge pressure of the pump. [33:8.4.4]

43.1.6.4.5

All pressure tubing, hose, and couplings shall be inspected at regular intervals. With the hose extended, the hose and couplings shall be tested using the in-service maximum operating pressure. Any hose showing material deteriorations, signs of leakage, or weakness in its carcass or at the couplings shall be replaced. [33:8.4.5]

43.1.6.5 Distribution Systems — General

43.1.6.5.1

Liquids shall be transported by means of closed containers, approved safety cans, or approved portable tanks or shall be transferred by means of a piping system. Open containers shall not be used for moving or storing liquids. [33:8.5.1]

43.1.6.5.2\*

Wherever liquids are transferred from one container to another, both containers shall be effectively bonded and grounded to dissipate static electricity. [33:8.5.2]

43.1.6.5.3

Containers that supply spray nozzles shall be of the closed type or shall be provided with metal covers that are kept closed. Containers that do not rest on the floor shall have supports or shall be suspended by wire cables. Containers that supply spray nozzles by gravity flow shall not exceed 10 gal (38 L) capacity. [33:8.5.3]

43.1.6.5.4

Original shipping containers shall not be subjected to air pressure for supplying spray nozzles. [33:8.5.4]

43.1.6.5.5

Containers that are pressurized to supply spray nozzles, air storage tanks, and coolers shall comply with all applicable requirements of the ASME Boiler and Pressure Vessel Code, Section VIII, for construction, tests, and maintenance. [33:8.5.5]

43.1.6.5.5.1

Containers that meet the following requirements need not meet the requirements of the ASME Boiler and Pressure Vessel Code, Section VIII, for construction, tests, and maintenance:

Pressure containers less than 6 in. (150 mm) in diameter

Pressure containers that operate at less than a gauge pressure of 15 psi (1.03 kPa)

Siphon-type spray cups

[33:8.5.5.1]

43.1.6.5.6

If a heater is used to heat the liquid being sprayed, it shall be low-pressure steam, low-pressure hot water, or electric. [33:8.5.6]

43.1.6.5.6.1

If electric heaters are used to heat the liquid being sprayed, the electric heater shall be approved and listed for the specific location in which it is used. (See Chapter 6 of NFPA 33.) [33:8.5.6.1]

43.1.6.5.6.2

Heaters shall not be located in spray booths or other locations subject to the accumulation of deposits of combustible residue. [33:8.5.6.2]

43.1.6.5.7

Agitators, if used, shall be driven by compressed air, water, low-pressure steam, or electricity. [33:8.5.7]

43.1.6.5.7.1

If the agitators are powered by an electric motor, the motor shall meet the requirements of Chapter 6 of NFPA 33. [33:8.5.7.1]

43.1.6.5.8

Methods for cleaning paint circulation systems shall meet the requirements of Chapter 18 of NFPA 30. [33:8.5.8]

43.1.6.5.9

Compressed air shall be permitted to be used for cleaning paint delivery hose for individual applicators in a spray booth, provided both of the following requirements are met:

The booth ventilation is operating.

The maximum air pressure does not exceed the maximum working pressure of any component of the piping or hose system.

[33:8.5.9]

43.1.7 Protection

43.1.7.1\* General

43.1.7.1.1

Spray areas, as defined in this Code, used for liquid spray operations and mixing rooms shall be protected with an approved automatic fire protection system. This shall apply to both manual and automated spray application processes. [33:9.1.1]

43.1.7.1.2

Spray areas used for powder application operations shall be in accordance with Section 15.5 of NFPA 33. [33:9.1.2]

43.1.7.1.3

The automatic fire protection system shall be permitted to be, and shall be installed in accordance with, any of the following:

An automatic water sprinkler system that meets all applicable requirements of NFPA 13

An automatic foam water sprinkler system that meets all applicable requirements of NFPA 16

A carbon dioxide extinguishing system that meets all applicable requirements of NFPA 12

A dry chemical extinguishing system that meets all applicable requirements of NFPA 17

A gaseous agent extinguishing system that meets all applicable requirements of NFPA 2001

A water mist fire protection system that meets the applicable requirements of NFPA 750

[33:9.1.3]

43.1.7.1.4

The fire alarm and fire protection system shall be supervised in accordance with NFPA 72. [33:9.1.4]

43.1.7.2 Ventilation Systems

Air make-up systems and spray area exhaust systems shall remain functioning during any fire condition. [33:9.2]

43.1.7.2.1

Where air exhausted from spray areas is recirculated, an interlock shall shut down the recirculation of air during any fire condition unless it can be demonstrated that shutdown creates a greater hazard. [33:9.2.1]

43.1.7.2.2

Air make-up systems, spray area recirculation systems, and spray area exhaust systems shall be permitted to be shut down and dampers shall be permitted to close where the automatic fire protection system type requires that ventilation be discontinued. [33:9.2.2]

43.1.7.3\* Coating Material Delivery Systems

43.1.7.3.1

Where a pump is used to supply the liquid used in the spray application process, an automatic means shall be provided to shut off the supply of liquid in the event of fire. [33:9.3.1]

43.1.7.3.2

When pressurized tanks larger than 5 gal (19 L) are used to supply the liquid used in the spray application process, an automatic means shall be provided to shut off liquid flow at the tank outlet in the event of fire. [33:9.3.2]

43.1.7.4 Conveyors

For operations where the workpiece is automatically conveyed through the spray area, activation of the automatic fire protection system shall automatically stop any conveyors into and out of the spray area. [33:9.4]

43.1.7.5 Automated Spray Application Operations

43.1.7.5.1 Interlock

For automated spray application operations, activation of the automatic fire protection system shall automatically accomplish all of the following:

Activate a local alarm in the vicinity of the spraying operation

Transmit an alarm signal to the facility's fire alarm system, if such a system is provided

Shut down all spray application operations

[33:9.5.1]

43.1.7.5.1.1

The requirements of 43.1.7.5.1 shall not apply to operations where the supply of flammable or combustible liquids is located within the spray area and does not exceed 5 gal (18.9 L). [33:9.5.1.1]

43.1.7.5.1.2

For automated spray application operations, the additional requirements of 43.1.7.9 for automated liquid electrostatic spray application equipment shall also apply. [33:9.5.1.2]

43.1.7.5.2 Emergency Shutdown

For automated spray application operations, one or more manual emergency system shutdown stations shall be installed to serve each spray area in accordance with the following requirements:

When activated, the stations shall accomplish at least the functions listed in 43.1.7.3, 43.1.7.4, and 43.1.7.5.1.

At least one such station shall be within ready access of operating personnel.

If access to the station required in 43.1.7.5.2(2) is likely to involve exposure to danger, an additional station shall be located adjacent to an exit from the area. [33:9.5.2]

43.1.7.6\* Automatic Sprinkler Systems

43.1.7.6.1\*

The automatic sprinkler system shall be a wet pipe system, a dry pipe system, a preaction system, or an open-head deluge system, whichever is most appropriate for the portion of the spray operation being protected. [33:9.6.1]

43.1.7.6.2

The automatic sprinkler system shall be designed as follows:

For spray application of styrene cross-link thermoset resin application areas, sprinklers shall be designed for Ordinary Hazard (Group 2) as defined in NFPA 13.

For powder coating operations, sprinklers shall be designed for Ordinary Hazard (Group 2) as defined in NFPA 13.

For all other spray areas, sprinklers shall be designed for Extra Hazard (Group 2) as defined in NFPA 13.

[33:9.6.2]

43.1.7.6.2.1

The sprinkler design area shall not be required to exceed the area of the booth or room in which spraying or resin application is conducted. [33:9.6.2.1]

43.1.7.6.3\*

The water supply shall be sufficient to supply all sprinklers likely to open in any one fire incident without depleting the available water for use in hose streams. [33:9.6.3]

43.1.7.6.3.1

Hose streams in accordance with NFPA 13 for the occupancy shall be included in the water suppression systems demands. [33:9.6.3.1]

43.1.7.6.4

Where sprinklers are installed to protect spray areas and mixing rooms only, water shall be permitted to be supplied from domestic water systems, provided the domestic supply can meet the demand for the design criteria of 43.1.7.6.2. [33:9.6.4]

43.1.7.6.5

The sprinkler system shall be controlled by a separate, listed indicating valve(s), operable from floor level. [33:9.6.5]

43.1.7.6.6\* Dust Protection

Sprinkler systems protecting stacks or ducts with widths or diameters equal to or greater than 10 in. (0.25 m) but less than 12 ft (3.7 m) shall meet all of the following requirements:

One sprinkler shall be located at the top of each vertical riser and at the midpoint of each offset. Additional sprinklers shall be spaced on 24 ft (7.3 m) centers if the rise is greater than 24 ft (7.3 m).

Horizontal exhaust ducts shall have sprinklers located on 12 ft (3.7 m) centers beginning no more than 6 ft (1.7 m) from the duct entrance.

If exhaust ducts are manifolded, a sprinkler shall be located in the manifold at the junction of each exhaust duct with the manifold.

Sprinklers shall provide a minimum flow of 30 gpm (114 L/min) per sprinkler at a minimum of 15 psi (1 bar) pressure.

Sprinklers shall be ordinary temperature rated, unless required to be higher due to operating temperatures measured in the ducts, in which case the operating temperature shall be at least 50°F (28°C) above the inside temperature of the duct.

The system demand shall include the discharge from the hydraulically most remote adjacent sprinklers in a common 100 linear ft (30.5 m) area of duct (horizontal and/or vertical).

The supply line to the duct sprinklers, if taken from the ceiling sprinkler system, shall be equipped with an accessible listed control valve.

[33:9.6.6]

43.1.7.6.6.1

Stacks and exhaust ducts shall be provided with access openings for inspection and maintenance of sprinklers. [33:9.6.6.1]

43.1.7.6.6.2

Sprinkler systems protecting stacks and ducts that are subject to freezing shall be of a nonfreezing type or be a manually controlled open-head system. [33:9.6.6.2]

43.1.7.6.7

Sprinklers shall be protected against overspray residue, either by location or covering, so that they will operate quickly in event of fire. [33:9.6.7]

43.1.7.6.7.1

Sprinklers shall be permitted to be covered only by cellophane bags having a thickness of 0.003 in. (0.08 mm) or less or by thin paper bags. These coverings shall be replaced frequently so that heavy deposits of residue do not accumulate. [33:9.6.7.1]

43.1.7.6.7.2

Sprinklers that have been painted or coated by overspray or residues shall be replaced with new sprinklers. [33:9.6.7.2]

43.1.7.7\* Automatic Carbon Dioxide, Dry Chemical, and Clean Agent Systems

The fire protection system shall be capable of discharging its contents into the entire protected area simultaneously, including the exhaust plenum and exhaust ductwork. [33:9.7]

43.1.7.8 Portable Fire Extinguishers

Portable fire extinguishers shall be provided and located in accordance with Section 13.6. [33:9.8]

43.1.7.9\* Protection for Automated Liquid Electrostatic Spray Application Equipment

43.1.7.9.1

Automated liquid electrostatic spray application equipment, both listed and unlisted, shall be further protected by listed optical flame detection, installed and supervised in accordance with NFPA 72. The optical flame detection shall, in event of ignition, react to the presence of flame within one-half (0.5) second and shall accomplish all of the following:

Meet all the requirements of 43.1.7.5.1

Disconnect power to the high-voltage elements in the spray area and de-energize the system

[33:9.9.1]

43.1.7.9.2

Automated liquid electrostatic spray application equipment that is unlisted shall be protected further by the following:

In addition to meeting the requirements in 43.1.7.9.1, the optical flame detection system shall also activate one of the following over each zone in which fire has been detected:

An open head deluge system designed to discharge a minimum density of 0.6 gpm/ft2 (24.4 mm/min)

A carbon dioxide extinguishing system

A dry chemical extinguishing system

A gaseous agent extinguishing system

A water mist fire protection system

Manual activation stations shall be installed. At least one such station shall be within ready access of operating personnel. If access to this station is likely to involve exposure to danger, an additional station shall be located adjacent to an exit from the area. These devices shall activate the fire protection system as specified in 43.1.7.9.2(1) and accomplish the requirements of 43.1.7.5.1 and 43.1.7.9.2(2).

A wet pipe sprinkler system shall also be provided throughout the spray booth. This system shall meet all the applicable requirements of NFPA 13 for Extra Hazard (Group 2) occupancies.

Automatic electrostatic equipment enclosures inside the booth systems shall be protected with an approved automatic fire protection system. Activation of this system shall automatically accomplish the requirements of 43.1.7.5.1 and 43.1.7.9.1(2).

[33:9.9.2]

43.1.7.10 Protection for Dry Particulate Scrubber

Protection for dry particulate scrubbers shall comply with Section 9.10 of NFPA 33.

43.1.7.11 Protection for Electrostatic Precipitator Scrubber

Protection for electrostatic precipitator scrubbers shall comply with Section 9.11 of NFPA 33.

43.1.7.12 Protection for High-Capacity Dry Paint Arrestor

Protection for high-capacity dry paint arrestors shall comply with Section 9.12 of NFPA 33.

43.1.8 Operations and Maintenance

43.1.8.1\* General

Maintenance procedures shall be established to ensure that all spray application apparatus and processes are operated and maintained in accordance with the manufacturers' specifications and the requirements of this Code. Maintenance shall be the responsibility of the users of the apparatus and processes. [33:10.1]

43.1.8.1.1\*

Spray application operations shall not be conducted outside predetermined spray areas. [33:10.1.1]

43.1.8.1.2

Inspection of extinguishing systems shall be conducted to ensure that the performance of the extinguishing system components will not be affected by overspray and residues. [33:10.1.2]

43.1.8.2\* Combustible Deposits

43.1.8.2.1

All spray areas shall be kept free of excessive accumulation of deposits of combustible residues. [33:10.2.1]

43.1.8.2.2

Combustible coverings (thin paper, plastic) and strippable coatings shall be permitted to be used to facilitate cleaning operations in spray areas. [33:10.2.2]

43.1.8.2.2.1

Where plastic covering is used, it shall be of a static dissipative nature or shall have a maximum breakdown voltage of 4 kV to prevent accumulation of a hazardous static electric charge. [33:10.2.2.1]

43.1.8.2.3

If residue accumulates to excess in booths, duct or duct discharge points, or other spray areas, all spraying operations shall be discontinued until conditions have been corrected. [33:10.2.3]

43.1.8.3 High-Pressure Hose Lines

High-pressure hose lines that convey flammable or combustible coating material in "airless" spray application operations shall be inspected daily and shall be repaired or replaced as necessary. Hose lines and equipment shall be located so that, in the event of a leak or rupture, coating material will not be discharged into any space having a source of ignition. [33:10.3]

43.1.8.4 Maintenance Procedures

43.1.8.4.1

Overspray collectors shall be inspected daily and clogged filters shall be discarded and replaced. Maintenance procedures shall be established to ensure that overspray collector filters are replaced before restriction to airflow is reduced below the minimum established by Section 7.2 of NFPA 33. [33:10.4.1]

43.1.8.4.2

At the close of the day's operation, all discarded overspray collector filters, residue scrapings, and debris contaminated with residue shall be removed immediately to a designated storage location, placed in a noncombustible container with a tight-fitting lid, or placed in a water-filled metal container. [33:10.4.2]

43.1.8.5\* Waste Containers

43.1.8.5.1

Approved waste containers shall be provided wherever rags or waste are impregnated with sprayed material, and all such rags or waste shall be deposited therein immediately after use. The contents of waste containers shall be placed in a designated storage location. [33:10.5.1]

43.1.8.5.2

Waste containers containing flammable liquids shall be located in ventilated areas that meet the requirements of 43.1.5. Such areas shall also meet the electrical area classification requirements of 43.1.4.4.5. [33:10.5.2]

43.1.8.5.3\*

Waste containers for flammable liquids shall be constructed of conductive materials and shall be bonded and grounded. [33:10.5.3]

43.1.8.5.4

Waste containers for flammable liquids shall be handled and stored in accordance with 43.1.6. [33:10.5.4]

43.1.8.6 Clothing

Employees' clothing contaminated with sprayed material shall not be left on the premises overnight unless kept in metal lockers. [33:10.6]

43.1.8.7 Cleaning Operations

43.1.8.7.1 Scope

Paragraph 43.1.8.7 shall apply to the use of flammable or combustible liquids for the flushing and cleaning of equipment. [33:10.7.1]

43.1.8.7.2 Liquids

Class I and Class II liquids used in cleaning operations shall be in original shipping containers or in listed safety containers. [33:10.7.2]

43.1.8.7.3 Location

Cleaning operations using flammable or combustible liquids shall be conducted inside a spray area with ventilating equipment operating or in ventilated areas that meet the requirements of 43.1.5. Such areas shall also meet the electrical area classification requirements of 43.1.4.4.5. [33:10.7.3]

43.1.8.7.4\* Equipment

Equipment using flammable or combustible liquids shall meet the requirements of 43.1.4.4.5 and shall be bonded and grounded. [33:10.7.4]

43.1.8.7.5 Manual Cleaning

Individual manual cleaning operations shall be limited to not more than 1 gal (4 L) of flammable or combustible liquid for each cleaning operator. [33:10.7.5]

43.1.8.7.6 Liquid Storage

Flammable and combustible liquids shall be handled and stored in accordance with 43.1.6. Containers used for handling, storage, or recovery of Class I liquids shall be constructed of conductive materials and shall be bonded and grounded. [33:10.7.6]

43.1.8.8 Solvent Distillation Units (Solvent Recyclers)

43.1.8.8.1 Scope

43.1.8.8.1.1

Paragraph 43.1.8.8 shall apply to solvent distillation units having distillation chambers or still pots that do not exceed 60 gal (227 L) nominal capacity and are used to recycle Class I, Class II, or Class IIIA liquids [FP < 200°F (93°C)]. [30:19.6.1.1]

43.1.8.8.1.2

Paragraph 43.1.8.8 shall not apply to research, testing, or experimental processes; to distillation processes carried out in petroleum refineries, chemical plants, or distilleries; or to distillation equipment used in dry cleaning operations. [30:19.6.1.2]

43.1.8.8.2 Equipment

Solvent distillation units shall be approved or shall be listed in accordance with UL 2208, Solvent Distillation Units. [30:19.6.2]

43.1.8.8.3 Solvents

Solvent distillation units shall only be used to distill liquids for which they have been investigated and that are listed on the unit's marking or contained within the manufacturer's literature. [30:19.6.3]

43.1.8.8.3.1

Unstable or reactive liquids or materials shall not be processed unless they have been specifically listed on the system's markings or contained within the manufacturer's literature. [30:19.6.3.1]

43.1.8.8.4 Location

43.1.8.8.4.1

Solvent distillation units shall be located and operated in locations in accordance with their approval or listing. [30:19.6.4.1]

43.1.8.8.4.2

Solvent distillation units shall not be used in basements. [30:19.6.4.2]

43.1.8.8.4.3

Solvent distillation units shall be located away from potential sources of ignition, as indicated on the unit's marking. [30:19.6.4.3]

43.1.8.8.5 Liquid Storage

Distilled liquids and liquids awaiting distillation shall be stored in accordance with NFPA 30. [30:19.6.5]

43.1.8.9\* Spontaneous Ignition Hazards

The same spray booth shall not be alternately used for different types of coating materials if the combination of the materials is conducive to spontaneous ignition, unless all deposits of the first-used coating material are removed from the booth and exhaust ducts prior to spraying with the second coating material. [33:10.9]

43.1.8.10\* Chlorinated Solvents

Coating materials containing chlorinated solvents shall not be used with spray application apparatus or fluid-handling equipment if the chlorinated solvent will come into contact with aluminum within a piping system, pump, enclosed container, or any enclosure that is capable of being pressurized by the potential reaction. This shall apply even if the container or system has been constructed with pressure relief devices. [33:10.10]

43.1.8.11 Smoking

Signs stating NO SMOKING OR OPEN FLAMES in large letters on contrasting color background shall be conspicuously posted at all spray areas and paint storage rooms. [33:10.11]

43.1.8.12\* Hot Work

Welding, cutting, and other spark-producing operations shall not be permitted in or adjacent to spray areas until a written permit authorizing such work has been issued. The permit shall be issued by a person in authority following his or her inspection of the area to ensure that precautions have been taken and will be followed until the job is completed. [33:10.12]

43.2 Automated Electrostatic Spray Equipment

For information on the installation and use of automated electrostatic spray application apparatus, see Chapter 11 of NFPA 33.

43.3 Handheld Electrostatic Spray Equipment

For information on the installation and use of handheld electrostatic spray application apparatus, see Chapter 12 of NFPA 33.

43.4 Drying, Curing, or Fusion Processes

For information on drying, curing, or fusion apparatus used in connection with spray application of flammable and combustible materials, see Chapter 13 of NFPA 33.

43.5 Miscellaneous Spray Operations

43.5.1 Vehicle Undercoating and Body Lining

43.5.1.1

Spray undercoating or spray body lining of vehicles that is conducted in an area that has adequate natural or mechanical ventilation shall be exempt from the provisions of this Code, if all the requirements of 43.5.1.1.1 through 43.5.1.1.4 are met. [33:14.1.1]

43.5.1.1.1

There shall be no open flames or spark-producing equipment within 20 ft (6100 mm) of the spray operation while the spray operation is being conducted. [33:14.1.1.1]

43.5.1.1.2

There shall be no drying, curing, or fusion apparatus in use within 20 ft (6100 mm) of the spray operation while the spray operation is being conducted. [33:14.1.1.2]

43.5.1.1.3

Any solvent used for cleaning procedures shall have a flash point not less than 100°F (37.8°C). [33:14.1.1.3]

43.5.1.1.4

The coating or lining materials used shall meet one of the following criteria:

Be no more hazardous than UL Class 30-40, when tested in accordance with UL 340, Tests for Comparative Flammability of Liquids

Not contain any solvent or component that has a flash point below 100°F (37.8°C)

Consist only of Class IIIB liquids and not include any organic peroxide catalyst

[33:14.1.1.4]

43.5.1.2 Noncomplying Undercoating Operations

Spray undercoating operations that do not meet the requirements of 43.5.1 shall meet all applicable requirements of this Code pertaining to spray finishing operations. [33:14.1.2]

43.5.2 Preparation Workstations

If spray finishing operations are performed at or in a preparation workstation, the preparation workstation shall be considered an unenclosed spray area and shall meet all requirements of an unenclosed spray area. [33:14.2]

43.5.2.1

A preparation workstation that is designed and operated in accordance with 43.5.3 shall be considered a limited finishing workstation and not an unenclosed spray area. [33:14.2.1]

43.5.3 Limited Finishing Workstations

43.5.3.1

A limited finishing workstation shall be designed and operated in accordance with the requirements of 43.5.3.2 through 43.5.3.10. [33:14.3.1]

43.5.3.2

A limited finishing workstation shall be designed and constructed to have all of the following:

A dedicated make-up air supply and air supply plenum

Curtains or partitions that are noncombustible or limited-combustible, as defined in 3.3.177 and 3.3.187.11 or that can successfully pass Test Method 2 in NFPA 701

A dedicated mechanical exhaust and filtration system

\* An approved automatic extinguishing system that meets the requirements of 43.1.7

[33:14.3.2]

43.5.3.3

The amount of material sprayed in a limited finishing workstation shall not exceed 1 gal (3.8 L) in any 8-hour period. [33:14.3.3]

43.5.3.4

The limited finishing workstation shall meet all applicable requirements of 43.1.2 through 43.1.8 and Section 43.10. [33:14.3.4]

43.5.3.5

Curtains or partitions shall be fully closed during any spray application operations. [33:14.3.5]

43.5.3.6

The area inside the curtains or partitions shall be considered a Class I, Division 1; Class I, Zone 1; Class II, Division 1; or Zone 21 hazardous (classified) location, as defined by Article 500 of NFPA 70. [33:14.3.6]

43.5.3.6.1

A Class I, Division 2; Class I, Zone 2; Class II, Division 2; or Zone 22 hazardous (classified) location, as applicable, shall extend 3 ft (915 mm) both horizontally and vertically beyond the volume enclosed by the outside surface of the curtains or partitions as shown in Figure 43.5.3.6.1. [33:14.3.6.1]

FIGURE 43.5.3.6.1 Class I, Division 2; Class I, Zone 2; Class II, Division 2; or Zone 22 Locations Adjacent to a Limited Finishing Workstation. [33:Figure 14.3.6.1]

43.5.3.6.2

For the purposes of this subsection, interlocked shall mean that the spray application equipment cannot be operated unless the exhaust ventilation system is operating and functioning properly and spray application is automatically stopped if the exhaust ventilation system fails. [33:14.3.6.2]

43.5.3.7

Any limited finishing workstation used for spray application operations shall not be used for any operation that is capable of producing sparks or particles of hot metal or for operations that involve open flames or electrical utilization equipment capable of producing sparks or particles of hot metal. [33:14.3.7]

43.5.3.8

Drying, curing, or fusion apparatus shall be permitted to be used in a limited finishing workstation if they meet the requirements of Section 43.4 and the requirements of 43.5.3.8.1 through 43.5.3.8.3. [33:14.3.8]

43.5.3.8.1

When industrial air heaters are used to elevate the air temperature for drying, curing, or fusing operations, a high limit switch shall be provided to automatically shut off the drying apparatus if the air temperature in the limited finishing workstation exceeds the maximum discharge-air temperature allowed by the standard that the heater is listed to or 200°F (93°C), whichever is less. [33:14.3.8.1]

43.5.3.8.2\*

A means shall be provided to show that the limited finishing workstation is in the drying or curing mode of operation and that it is to be unoccupied. [33:14.3.8.2]

43.5.3.8.3

Any containers of flammable or combustible liquids shall be removed from the limited finishing workstation before the drying apparatus is energized. [33:14.3.8.3]

43.5.3.9

Portable spot-drying, curing, or fusion apparatus shall be permitted to be used in a limited finishing workstation, provided that it is not located within the hazardous (classified) location defined in 43.5.3.6 when spray application operations are being conducted. [33:14.3.9]

43.5.3.10

Recirculation of exhaust air shall be permitted only if all provisions of 43.1.5.5 are met. [33:14.3.10]

43.6 Powder Coating

43.6.1

For information on the installation and use of powder coating application apparatus, see Chapter 15 of NFPA 33.

43.6.2

Sprinklers shall be protected against overspray residue by either location or covering in order to operate quickly in event of fire. [33:15.5.7.6]

43.6.2.1

Sprinklers shall be permitted to be covered by either cellophane bags that are equal to or less than 0.08 mm (0.003 in.) thick or by thin paper bags. [33:15.5.7.6.1]

43.6.2.2

The coverings permitted in 43.6.2.1 shall be replaced frequently so that heavy deposits of residue do not accumulate. [33:15.5.7.6.2]

43.6.3

Sprinklers that have been painted or coated by overspray or residues shall be replaced with new sprinklers. [33:15.5.7.7]

43.7 Organic Peroxides and Plural Component Coatings

43.7.1\* Scope

Section 43.7 shall apply to the spray application operations that involve the use of organic peroxide formulations and other plural component coatings.

Exception: As covered in Section 43.8. [33:16.1]

43.7.2 General

Spray application operations that involve the use of organic peroxide formulations and other plural component coatings shall be conducted in spray areas that are protected by approved automatic sprinkler systems that meet the requirements of 43.1.7. [33:16.2]

43.7.3 Prevention of Contamination

Measures shall be taken to prevent the contamination of organic peroxide formulations with any foreign substance. Only spray guns and related handling equipment that are specifically manufactured for use with organic peroxide formulations shall be used. Separate fluid-handling equipment shall be used for the resin and for the catalyst, and they shall not be interchanged. [33:16.3]

43.7.3.1

The wetted portions of equipment and apparatus that handle organic peroxide formulations shall be constructed of stainless steel (300 series), polyethylene, Teflon®, or other materials that are specifically recommended for the application. [33:16.3.1]

43.7.3.2\*

Measures shall be taken to prevent contamination of organic peroxide formulations with dusts or overspray residues resulting from the sanding or spray application of finishing materials. [33:16.3.2]

43.7.3.3

Spills of organic peroxide formulations shall be promptly removed so there are no residues. Spilled material shall be permitted to be absorbed by use of a noncombustible absorbent, which is then disposed of promptly in accordance with the manufacturer's recommendations. [33:16.3.3]

43.7.4 Storage of Organic Peroxides

Organic peroxide formulations shall be stored in accordance with the requirements of Chapter 75 and with the manufacturers' recommendations. [33:16.4]

43.7.5 Handling of Organic Peroxides

Measures shall be taken to prevent handling of organic peroxide formulations to avoid shock and friction, which can cause decomposition and violent reaction. [33:16.5]

43.7.6\* Mixing of Organic Peroxides With Promoters

Organic peroxide formulations shall not be mixed directly with any cobalt compounds or other promoters or accelerators, due to the possibility of violent decomposition or explosion. To minimize the possibility of such accidental mixing, these materials shall not be stored adjacent to each other. [33:16.6]

43.7.7 Smoking

Smoking shall be prohibited, NO SMOKING signs shall be prominently displayed, and only nonsparking tools shall be used in any area where organic peroxide formulations are stored, mixed, or applied. [33:16.7]

43.7.8 Trained Personnel

Only designated personnel trained to use and handle organic peroxide formulations shall be permitted to use these materials. [33:16.8]

43.7.9 Material Safety Data Sheets

Where organic peroxide formulations are used, the material safety data sheet (MSDS) or its equivalent shall be consulted. [33:16.9]

43.8 Styrene Cross-Linked Composites Manufacturing (Glass Fiber-Reinforced Plastics)

43.8.1\* Scope

Section 43.8 shall apply to manufacturing processes involving spray application of styrene cross-linked thermoset resins (commonly known as glass fiber-reinforced plastics) for hand lay-up or spray fabrication methods, that is, resin application areas, and where the processes do not produce vapors that exceed 25 percent of the lower flammable limit. [33:17.1]

43.8.2 Resin Application Equipment

The equipment and apparatus for spray application of the resin shall be installed and used in accordance with the requirements of Sections 43.7 and 43.8. [33:17.2]

43.8.3\* Fire Protection

Resin application areas shall be protected in accordance with 43.1.7. [33:17.3]

43.8.4 Resin Storage

The quantity of flammable and combustible liquids located in the vicinity of resin application areas outside an inside storage room or storage cabinet in any one process area shall not exceed the greater of any of the following:

A supply for one day

The sum of 25 gal (95 L) of Class LA liquids in containers and 120 gal (454 L) of Class IB, IC, II, or III liquids in containers

One approved portable tank not exceeding 660 gal (2500 L) of Class IB, IC, II, or III liquids

[33:17.4]

43.8.5 Electrical and Other Hazards

43.8.5.1

Electrical wiring and utilization equipment located in resin application areas that is not subject to deposits of combustible residues shall be installed in accordance with the requirements of NFPA 70 for Ordinary Hazard locations. [33:17.5.1]

43.8.5.2

Electrical wiring and utilization equipment located in resin application areas that is subject to deposits of combustible residues shall be listed for such exposure and shall be suitable for Class I, Division 2 or Class I, Zone 2 locations if applicable as defined in 43.1.4.2.1.2. [33:17.5.2]

43.8.5.3\*

All metal parts of resin application areas, exhaust ducts, ventilation fans, spray application equipment, workpieces or containers that receive the spray stream, and piping that conveys flammable or combustible liquids shall be electrically grounded. [33:17.5.3]

43.8.5.4

Space heating appliances or other hot surfaces in resin application areas shall not be located where deposits or residues accumulate. [33:17.5.4]

43.8.6 Ventilation

43.8.6.1

Mechanical ventilation shall be designed and installed throughout the resin application area in accordance with the requirements of 43.1.5. [33:17.6.1]

43.8.6.1.1

Buildings that are not enclosed for at least three-quarters of their perimeter shall not be required to meet this requirement. [33:17.6.1.1]

43.8.6.2

Local ventilation shall be provided where personnel are under or inside of the workpiece being fabricated. [33:17.6.2]

43.8.7 Use and Handling

43.8.7.1

The storage and use of organic peroxide formulations shall meet the requirements of Section 43.7. [33:17.7.1]

43.8.7.2

Excess catalyzed resin, while still in the liquid state, shall be drained into an open-top, noncombustible container. Enough water shall be added to the container to cover the contained resin by at least 2 in. (50 mm). [33:17.7.2]

43.8.7.3

In areas where chopper guns are used, paper, polyethylene film, or similar material shall be provided to cover the exposed surfaces of the walls and floor to allow the buildup of overchop to be removed. [33:17.7.3]

43.8.7.3.1

Accumulated overchop shall be disposed of when it has reached an average thickness of 2 in. (50 mm). [33:17.7.3.1]

43.8.7.3.2

Used paper, polyethylene film, or similar material shall be placed in a noncombustible container and disposed of when removed from the facility. [33:17.7.3.2]

43.9 Dipping, Coating, and Printing Processes

43.9.1

Dipping, roll coating, flow coating, curtain coating, printing, cleaning, and similar processes, hereinafter referred to as "coating processes" or "processes," in which articles or materials are passed through tanks, vats, or containers, or passed over rollers, drums, or other process equipment that contain flammable or combustible liquids shall comply with NFPA 34 and Section 43.9. [34:1.1.1]

43.9.1.1

Section 43.9 shall also apply to cleaning processes that utilize a solvent vapor, such as vapor degreasing processes. [34:1.1.2]

43.9.1.2

Section 43.9 shall also apply to processes that use water-borne, water-based, and water-reducible materials that contain flammable or combustible liquids or that produce combustible deposits or residues. [34:1.1.3]

43.9.1.3

Section 43.9 shall not apply to processes that use only noncombustible liquids for processing and cleaning. Section 43.9 shall also not apply to processes that use only Class IIIB liquids for processing or cleaning, provided the liquids or mixtures thereof maintain their Class IIIB classification at their point of use. [34:1.1.4]

43.9.1.4

Section 43.9 shall not apply to processes that use a liquid that does not have a fire point when tested in accordance with ASTM D92, Standard Test Method for Flash and Fire Points by Cleveland Open Cup, up to the boiling point of the liquid or up to a temperature at which the sample being tested shows an obvious physical change. [34:1.1.5]

43.9.1.5

Section 43.9 shall not apply to fluidized bed powder application. (See Chapter 15 of NFPA 33.) [34:1.1.6]

43.9.1.6\*

Section 43.9 shall not apply to quench tanks that are addressed in Chapter 51 of this Code.

43.9.2\*

Where unusual industrial processes are involved, the AHJ shall be permitted to require additional safeguards or modifications to the requirements of NFPA 34, provided equivalent safety is achieved.

43.10 Training

43.10.1\* General

All personnel involved in the spray application processes covered by this Code shall be instructed in the following:

Potential safety and health hazards

Operational, maintenance, and emergency procedures required

Importance of constant operator awareness

[33:19.1]

43.10.1.1

Personnel required to handle or use flammable or shall be instructed in the safe handling, storage, and use of the materials, as well as emergency procedures. [33:19.1.1]

43.10.1.2\*

All personnel required to enter or to work within confined or enclosed spaces shall be instructed as to the nature of the hazard involved, the necessary precautions to be taken, and the use of protective and emergency equipment required. [33:19.1.2]

43.10.1.3

All personnel shall be instructed in the proper use, maintenance, and storage of all emergency, safety, or personal protective equipment that they might be required to use in their normal work performance. [33:19.1.3]

43.10.1.4

Documentation shall be employed to record the type and date of training provided to each individual involved in these processes. [33:19.1.4]