

## **CHAPTER 15 FLAMMABLE FINISHES**

### **SECTION FC 1501 GENERAL**

**1501.1 Scope.** This chapter shall govern the following operations, and the design, installation, operation and maintenance of any building, structure or premises wherein such operations are conducted:

1. The application of flammable finishes to articles or materials by means of spray apparatus.
2. The application of flammable finishes by dipping or immersing articles or materials into the contents of tanks, vats or containers of flammable or combustible liquids for coating, finishing, treatment and similar processes.
3. The application of flammable finishes utilizing powder spray guns, electrostatic powder spray guns, fluidized beds or electrostatic fluidized beds to apply combustible powders.
4. Floor finishing operations.
5. The application of flammable finishes consisting of dual-component coatings or Class I or II liquids when applied by brush or roller in quantities exceeding 1 gallon (4 L).

**1501.2 Permits.** Permits shall be required as set forth in FC105.6.

**1501.3 General.** Flammable finishing operations governed by this chapter shall be conducted in accordance with this chapter. The buildings and premises in which such flammable finishing operations are conducted shall be designed, installed, operated and maintained in accordance with this chapter.

**1501.4 Supervision.** The following finishing operations shall be conducted by or under the personal supervision of a certificate of fitness holder:

1. Spray-finishing and dipping operations.
2. Floor finishing operations requiring a permit.

**1501.5 Certificate of approval.** Pre-manufactured spray rooms and pre-manufactured spray booths that circulate heated air shall be of a type for which a certificate of approval has been issued in accordance with this code, or which was previously approved by the Department of Buildings or the Board of Standards and Appeals, unless such approval is amended or repealed by the commissioner.

### **SECTION FC 1502 DEFINITIONS**

**1502.1 Definitions.** The following terms shall, for the purposes of this chapter and as used elsewhere in this code, have the meanings shown herein.

**DETEARING.** A process for rapidly removing excess wet coating material from a dipped or coated object or material by passing it through an electrostatic field.

**DIP TANK.** A tank, vat or other container of flammable or combustible liquid in which articles or materials are immersed for the purpose of coating, finishing, treating and similar processes.

**ELECTROSTATIC FLUIDIZED BED.** A container holding powder coating material that is aerated from below so as to form an air-supported expanded cloud of such material which is electrically charged with a charge opposite to the charge of the object to be coated. Such object is transported through the container immediately above the charged and aerated materials in order to be coated.

**FLAMMABLE FINISHES.** Material coatings in which the material being applied is a flammable liquid, combustible liquid, combustible powder or flammable or combustible gel coating.

**FLAMMABLE VAPOR AREA.** The interior of any room, booth or area, including spray rooms, spray booths, exhaust ducts and drying rooms, or other areas in which, as a result of flammable finishing operations, the concentration of flammable constituents (vapor, gas, fume, mist or dust) in air exceeds 25 percent of their lower flammable limit (LFL).

**FLOOR FINISHING OPERATION.** Any activity involving the surfacing or finishing of a floor, including but not limited to cleaning, stripping, sealing, painting, varnishing, lacquering, staining and waxing.

**FLUIDIZED BED.** A container holding powder coating material that is aerated from below so as to form an air-supported expanded cloud of such material through which the preheated object to be coated is immersed and transported.

**LIMITED-SPRAYING SPACE.** An area in which spraying operations for touch-up or spot painting of a surface area of 9 square feet (0.84m<sup>2</sup>) or less per workpiece are conducted.

**RESIN APPLICATION AREA.** An area where reinforced plastics are used to manufacture products by hand lay-up or spray-fabrication methods.

**ROLL COATING.** The process of coating, spreading and impregnating fabrics, paper or other materials as they are passed directly through a tank or trough containing flammable or combustible liquids, or over the surface of a roller revolving partially submerged in a flammable or combustible liquid.

**SPRAY BOOTH.** A mechanically ventilated appliance of varying dimensions and construction provided to enclose or accommodate a spraying operation and to confine and limit the escape of spray vapor and residue and to exhaust it safely.

**SPRAY ROOM.** A room designed to accommodate spraying operations constructed in accordance with the Building Code. The room enclosure shall be at least 2-hour fire-resistant rated.

**SPRAYING SPACE.** The interior of a spray room, spray booth, exhaust duct, or other area in which, as a result of flammable finishing operations, surfaces are exposed to flammable vapors or mists or combustible dust, and are susceptible to accumulation of flammable or combustible residues or deposits.

## **SECTION FC 1503 PROTECTION OF OPERATIONS**

**1503.1 General.** Operations covered by this chapter shall be protected as required by this section and the Electrical Code.

**1503.2 Sources of ignition.** Protection against sources of ignition shall be provided in accordance with FC 1503.2.1 through 1503.2.8.

**1503.2.1 Electrical wiring and equipment.** Electrical wiring and equipment shall comply with the requirements of this chapter and the Electrical Code.

**1503.2.1.1 Flammable vapor areas.** Electrical wiring and equipment in flammable vapor areas shall be of an explosion-proof type approved for use in such hazardous locations. Such areas shall be considered to be Class I, Division 1 or Class II, Division 1 hazardous locations in accordance with the Electrical Code.

**1503.2.1.2 Areas subject to deposits of residues.** Electrical equipment in flammable vapor areas and drying operations which are subject to splashing or dripping of liquids shall be specifically approved for locations containing deposits of readily ignitable residue and explosive vapors.

### **Exceptions:**

1. Wiring in rigid conduit and threaded boxes or fittings not containing taps, splices or terminal connections.
2. Electrostatic equipment complying with the requirements of FC1507.

**1503.2.1.2.1 Resin application areas.** In resin application areas, electrical wiring and equipment that is subject to deposits of combustible residues shall be listed for such exposure and shall be installed as required for hazardous (classified) locations. Electrical wiring and equipment not subject to deposits of combustible residues shall be installed as required for ordinary hazard locations.

**1503.2.1.3 Areas adjacent to spray booths.** Electrical wiring and equipment located outside of, but within 5 feet (1524 mm) horizontally and 3 feet (914 mm) vertically of

openings in a spray booth or a spray room shall be approved for Class I, Division 2 or Class II, Division 2 hazardous locations, whichever is applicable.

**1503.2.1.4 Areas subject to overspray deposits.** Electrical equipment in flammable vapor areas located such that deposits of combustible residues could readily accumulate thereon shall be specifically approved for locations containing deposits of readily ignitable residue and explosive vapors in accordance with the Electrical Code.

**Exceptions:**

1. Wiring in rigid conduit and threaded boxes or fittings not containing taps, splices or terminal connections.
2. Equipment complying with the requirements of FC 1504 and 1507 and FC Chapter 21.

**1503.2.2 Open flames and sparks.** Open flames and spark-producing devices shall not be located in flammable vapor areas and shall not be located within 20 feet (6096 mm) of such areas unless separated by a permanent partition.

**Exception:** Drying and baking apparatus complying with the requirements of FC1504.3.4.2.

**1503.2.3 Hot surfaces.** Heated surfaces having a temperature sufficient to ignite vapors shall not be located in flammable vapor areas. Space-heating appliances, steam pipes or hot surfaces in flammable vapor areas shall be located such that they are not subject to accumulation of deposits of combustible residues.

**Exception:** Drying apparatus complying with the requirements of FC1504.3.4.2.

**1503.2.4 Equipment enclosures.** Equipment or apparatus that is capable of producing sparks or particles of hot metal that would fall into a flammable vapor area shall be totally enclosed.

**1503.2.5 Grounding.** Metal parts of spray booths, exhaust ducts and piping systems conveying Class I or II liquids shall be electrically grounded in accordance with the Electrical Code. Metallic parts located in resin application areas, including but not limited to exhaust ducts, ventilation fans, spray application equipment, workpieces and piping, shall be electrically grounded.

**1503.2.6 Smoking prohibited.** It shall be unlawful to smoke in flammable vapor areas and hazardous material storage rooms associated with flammable finishing operations. “No Smoking” signs complying with the requirements of FC310 shall be conspicuously posted in such areas.

**1503.2.7 Hot work warning signs.** Welding, cutting and other hot work operations shall not be conducted in or adjacent to flammable vapor areas. Durable signs bearing the following

warning shall be conspicuously posted in the vicinity of flammable vapor areas and flammable finishing material storage rooms:

NO WELDING  
THE USE OF WELDING OR CUTTING  
EQUIPMENT IN OR NEAR THIS AREA  
IS DANGEROUS BECAUSE OF FIRE  
AND EXPLOSION HAZARDS.

**1503.2.8 Powered industrial trucks.** Powered industrial trucks used in electrically classified areas shall be listed for such use.

**1503.3 Storage, handling and use of flammable and combustible liquids.** Flammable and combustible liquids shall be stored, handled and used in accordance with this section and FC Chapter 34.

**1503.3.1 Use.** Containers supplying spray nozzles shall be of a closed type or provided with metal covers which are kept closed. Containers not resting on floors shall be on noncombustible supports or suspended by wire cables. Containers supplying spray nozzles by gravity flow shall not exceed 10 gallons (37.9 L) in capacity.

**1503.3.2 Valves.** Containers and piping to which a hose or flexible connection is attached shall be provided with a shutoff valve at the connection. Such valves shall be kept shut when hoses are not in use.

**1503.3.3 Pumped liquid supplies.** Where flammable or combustible liquids are supplied to spray nozzles by positive displacement pumps, pump discharge lines shall be provided with an approved relief valve discharging to pump suction or a safe detached location.

**1503.3.4 Liquid transfer.** Where a flammable liquid is transferred from one portable container to another, a bond shall be provided between the two containers. At least one container shall be grounded. Piping systems for Class I and Class II liquids shall be permanently grounded.

**1503.3.5 Class I liquids as solvents.** Class I liquids used as solvents shall be used in spray gun and equipment cleaning machines which have been listed and approved for the purpose or shall be used in spray booths or spray rooms in accordance with FC 1503.3.5.1 and 1503.3.5.2.

**1503.3.5.1 Listed devices.** Cleaning machines for spray guns and equipment shall not be located in areas open to the public and shall be separated from ignition sources in accordance with their listings or by a distance of 3 feet (914 mm), whichever is greater. The quantity of solvent used in a machine shall not exceed the design capacity of the machine.

**1503.3.5.2 Within spray booths and spray rooms.** Mechanical ventilation equipment shall be operated when solvents are used for cleaning spray nozzles and auxiliary

equipment and for a period of time thereafter to allow for the exhaust of the vapors within spray booths and spray rooms.

**1503.3.6 Class II and Class III liquids.** Solvents used outside of spray booths, spray rooms or listed and approved spray gun and equipment cleaning machines shall be restricted to Class II and Class III liquids.

**1503.4 Operations and maintenance.** Flammable vapor areas, exhaust fan blades and exhaust ducts shall be kept free from the accumulation of deposits of combustible residues. Where excessive residue accumulates in such areas, spraying operations shall be discontinued until the accumulation is removed from such areas and properly disposed of.

**1503.4.1 Tools.** Scrapers, spuds and other tools used for cleaning purposes shall be constructed of non-sparking materials.

**1503.4.2 Residue.** Residue removed during cleaning and debris contaminated with residue shall be immediately removed from the premises and disposed of lawfully.

**1503.4.3 Waste cans.** Approved metal waste cans equipped with self-closing lids shall be provided wherever rags or waste are impregnated with finishing material. Such rags and waste shall be deposited therein immediately after being utilized. The contents of waste cans shall be properly disposed of at the end of each work shift and at least once daily.

**1503.4.4 Solvent recycling.** Solvent distillation equipment used to recycle and clean dirty solvents shall comply with the requirements of FC3405.4.

## **SECTION FC 1504 SPRAY FINISHING**

**1504.1 General.** Spraying operations involving the use of flammable or combustible liquids in continuous or intermittent processes shall be conducted in accordance with this section and FC 1503 and 1507, as applicable.

**1504.2 Location.** Except in Group A, E, I and R occupancies, spraying operations shall be conducted in a spray room or a spray booth complying with the applicable requirements of FC 1504.3, unless the extent of such operations allows them to be conducted in a limited-spraying space in accordance with FC1504.5. In Group A, E, I and R occupancies, spray-finishing operations shall be conducted in a spray room in compliance with the applicable requirements of FC1504.3.

### **Exceptions:**

1. Approved automobile undercoating spray operations and spray-on automotive lining operations, utilizing liquids having a flashpoint above 140°F (60°C), when conducted in areas with approved natural or mechanical ventilation.

2. The application of resin in the manufacturing of reinforced plastics in accordance with FC1509.

**1504.2.1 Below grade areas.** Spray rooms and spray booths shall not be located in basements, cellars or other areas below grade.

**1504.3 Design and installation.** Spray rooms and spray booths shall be designed and installed in compliance with the requirements of FC 1504.3.1 through 1504.3.7, as applicable.

**1504.3.1 Construction of spray rooms.** Spray rooms shall be designed and installed in compliance with the requirements of the Building Code and Mechanical Code, including vertical and horizontal separation from other spaces. Spray rooms shall additionally comply with the requirements of this section.

**1504.3.2 Construction of spray booths.** Spray booths shall be designed and installed in compliance with the requirements of the Building Code and Mechanical Code, NFPA 33 and this section.

**1504.3.2.1 Materials.** Spray booths shall be constructed of approved noncombustible materials. Aluminum shall not be used. Where walls or ceiling assemblies are constructed of sheet metal, single-skin assemblies shall be no thinner than 0.0478 inch (18 gage) (1.2 mm) and each sheet of double-skin assemblies shall be no thinner than 0.0359 inch (20 gage) (0.9 mm). Structural sections of spray booths may be sealed with latex-based or similar caulks and sealants. The interior surfaces of spray booths shall be smooth and shall be constructed so as to permit the free passage of exhaust air from all parts of the interior and to facilitate washing and cleaning, and shall be designed to confine residues within the booth.

**1504.3.2.2 Clear space.** Spray booths shall be installed so that all parts of the booth are readily accessible for cleaning and other maintenance. A clear space of not less than 3 feet (914 mm) shall be maintained on all sides of the spray booth.

**Exception.** A clear space of less than 3 feet (914 mm) may be maintained from an interior partition, wall or floor/ceiling assembly with a fire-resistance-rating of not less than 1 hour, or an exterior wall or roof assembly of a noncombustible wall or roof.

**1504.3.2.3 Size.** The aggregate area of spray booths in a building shall not exceed the lesser of 10 percent of the area of any floor of the building or the floor area allowed for a Group H-2 occupancy by the Building Code, as set forth in Table 503 of the Building Code, excluding any area increases allowed by Section 506 of the Building Code. The area of an individual spray booth in a building shall not exceed the lesser of the aggregate size limit or 1,500 square feet (139 m<sup>2</sup>).

**Exception:** A single spray booth not exceeding 500 square feet (46 m<sup>2</sup>) is allowed irrespective of the results of the required calculations.

**1504.3.2.4 Waterwash spray booths.** Waterwash spray booths shall be of an approved design so as to prevent excessive accumulation of deposits in ducts and residue at duct outlets. Such booths shall be arranged so that air and overspray are drawn through a continuously flowing water curtain before being exhausted outdoors.

**1504.3.2.5 Means of egress.** Means of egress doors from pre-manufactured spray booths shall not be less than 30 inches (762 mm) in width by 80 inches (2032 mm) in height.

**1504.3.3 Fire protection.** Spray rooms and spray booths shall be protected by a fire extinguishing system in compliance with the requirements of this section.

**1504.3.3.1 Spray rooms.** Spray rooms shall be protected throughout by a sprinkler system. Such sprinkler system shall also protect exhaust plenums, exhaust ducts and both sides of dry filters when such filters are used.

**1504.3.3.2 Spray booths.** Spray booths shall be protected throughout by a fire extinguishing system. Such fire extinguishing system shall also protect exhaust plenums, exhaust ducts and both sides of dry filters when such filters are used.

**1504.3.3.3 Automated spraying operations.** The fire extinguishing system for each spray room or spray booth designed for automatic spraying operations shall be equipped with an interlock in accordance with FC1504.3.5(7) and with a manual shutdown device. Such manual shutdown device shall be located within the path of emergency egress from such spray room or spray booth, shall be readily accessible to personnel supervising the spraying operation, and when activated, shall initiate the same functions as the automatic interlock.

**1504.3.4 Drying operations.** Spray rooms and spray booths shall not be used for drying operations that could cause an increase in the surface temperature of the spray room or spray booth, unless such operations are conducted in compliance with the requirements of FC 1504.3.4.1, 1504.3.4.2 and 1504.3.5.

**1504.3.4.1 Spraying procedure.** The spraying procedure shall use low-volume spray application.

**1504.3.4.2 Drying and baking apparatus.** Fixed drying and baking apparatus shall comply with the requirements of this chapter and the applicable provisions of FC Chapter 21. When recirculation ventilation is provided in accordance with FC1504.3.7.1, the heating system shall not be within the recirculation air path.

**1504.3.5 Interlocks.** The spraying apparatus, drying apparatus and ventilating system for the spray room or spray booth shall be equipped with interlocks designed to automatically:

1. prevent operation of spraying apparatus while drying operations are in progress.
2. prevent the operation of the drying apparatus until the spray room or spray booth has been purged of vapors for a period of at least 3 minutes.



3. shut down the drying apparatus in the event that the ventilation system fails to operate within the spray room or spray booth during the drying process.
4. shut down the drying apparatus if the air temperature within the spray room or spray booth exceeds 200°F (93°C).
5. prevent the spraying operation unless the ventilation system is in operation.
6. shut down the spraying operation in a spray booth equipped with a filter roll when the filter roll fails to automatically advance when the air velocity falls below the minimum design level.
7. shut down the spraying operation, drying operation and workpiece conveyors into and out of the flammable vapor area, and notify the building fire alarm system, upon activation of the fire extinguishing systems protecting an automated spraying operation.

**1504.3.6 Illumination.** Only fixed luminaires protected by a glass panel shall be utilized as a source of illumination in spray rooms and spray booths. Such luminaires and glass panels shall comply with the requirements of FC 1504.3.6.1 through 1504.3.6.3, as applicable.

**1504.3.6.1 Glass panels.** Panels for light fixtures or for observation shall be of heat-treated glass, wired glass or hammered-wire glass, and shall be sealed to confine vapor, gas, fume, mists or dust to the flammable vapor area. Panels for luminaires shall be separated from the luminaire to prevent the surface temperature of the panel from exceeding 200°F (93°C).

**1504.3.6.2 Exterior luminaires.** Luminaires approved for use in ordinary hazard locations may be used when the luminaire is attached to an exterior wall or ceiling of a spray room or spray booth, but is separated and protected from the flammable vapor area by a vapor-tight glass panel. Such luminaires shall be serviced exclusively from outside the flammable vapor area.

**1504.3.6.3 Integral luminaires.** Luminaires approved for use in hazardous locations shall be used when the luminaire is an integral part of the walls or ceiling of a spray room or spray booth. Such luminaires shall be listed for use in Class I, Division 2 or Class II, Division 2 locations, as applicable. Such luminaires may be serviced from inside the flammable vapor area.

**1504.3.7 Ventilation.** Mechanical ventilation of flammable vapor areas shall be provided in accordance with Chapter 5 of the Mechanical Code and this section.

**1504.3.7.1 Recirculation.** Air exhausted from spraying operations shall not be recirculated, except as authorized by the Mechanical Code.

**1504.3.7.2 Prohibition.** Makeup air and flammable vapor area exhaust systems shall not be interlocked with the fire alarm system. The ventilation system shall remain in operation upon activation of the building fire alarm system.

**Exception:** Where the type of fire extinguishing system used requires that ventilation be discontinued, makeup air and exhaust systems shall shut down and dampers shall close.

**1504.3.7.3 Filters.** Spray rooms and spray booths shall be provided with exhaust filters. Air intake filters are not required, but if part of a spray room or spray booth wall or ceiling assembly shall be listed as Class I or Class II in accordance with UL 900.

**1504.3.7.3.1 Supports.** Supports and holders for filters shall be constructed of noncombustible materials.

**1504.3.7.3.2 Attachment.** Overspray collection filters shall be readily removable and accessible for cleaning or replacement.

**1504.3.7.3.3 Monitoring air velocity.** One or more devices shall be provided to monitor the air velocity of the air being exhausted from a spray room or spray booth and to provide an indication, alarm or system shutdown if the required velocity is not being maintained. The device monitoring the air flow shall visually display the pressure of the exhausted air, activate an alarm and/or shut down the spraying operation.

**1504.4 Operation and maintenance.** Facilities in which spraying operations and drying operations are conducted shall be operated and maintained in compliance with the requirements of this section.

**1504.4.1 Spraying of incompatible materials.** Spray rooms and spray booths shall not be utilized for spraying operations utilizing alternating incompatible materials, unless all deposits of one material are removed from the room or booth and exhaust ducts, and dry filters replaced, prior to spraying with the incompatible material.

**1504.4.2 Filter disposal.** Discarded exhaust filters shall be immediately removed from the spray room or spray booth and disposed of in accordance with FC304.3.1.

**1504.4.3 Sprinkler head protection.** Sprinkler heads installed in spraying spaces shall be protected in an approved manner from accumulation of residue from spraying operations. Sprinkler heads shall be inspected at least once per week and cleaned as needed. Bags used as a protective covering shall be of 0.003-inch-thick (0.076-mm-thick) polyethylene or cellophane or shall be of thin paper. Sprinkler heads contaminated by overspray particles shall be replaced with new sprinkler heads.

**1504.4.4 Floor protection.** Combustible floor construction in spraying spaces shall be covered by an approved, noncombustible, nonsparking material, except that combustible coverings, such as thin paper or plastic and strippable coatings, may be utilized over the

noncombustible, nonsparking floor covering material on combustible floors, and on noncombustible floors, to facilitate cleaning operations in spraying spaces.

**1504.4.5 Portable electric lamps.** Portable electric lamps shall not be stored or used in the flammable vapor area.

**Exception:** Portable electric lamps of a type approved for hazardous locations may be used to provide additional lighting for cleaning or maintenance in such areas.

**1504.4.6 Portable infrared apparatus.** Portable electrical equipment located within 18 inches (457 mm) of floor level shall be approved for Class I, Division 2, hazardous locations. Metallic parts of drying apparatus shall be electrically bonded and grounded. During spraying operations, portable drying apparatus and electrical connections and wiring thereto shall not be located within spray booths, spray rooms or other spraying space.

**1504.4.7 Continuous ventilation.** Mechanical ventilation shall be kept in operation at all times while spraying operations are being conducted and for a sufficient time thereafter to allow vapors from drying coated articles and finishing material residue to be exhausted.

**1504.4.8 Obstruction of exhaust ventilation.** Articles being sprayed shall be positioned in a manner that does not obstruct collection of overspray.

**1504.4.9 Hazardous and combustible material storage.** The clear space around spray booths pursuant to FC1504.3.2.2 shall be kept free of hazardous material and combustible material storage.

**1504.4.10 Portable fire extinguishers.** Spraying spaces shall be provided with portable fire extinguishers for an extra (high) hazard occupancy in accordance with FC906.

**1504.5 Limited-spraying spaces.** Spray finishing operations may be conducted in a limited-spraying space when the spraying operations are limited in size and frequency and are conducted in a properly ventilated and electrically wired space in compliance with the requirements of FC 1504.5.1 through 1504.5.5.

**1504.5.1 Job size.** The surface area of any workpiece to be sprayed shall not exceed 9 square feet (0.84 m<sup>2</sup>).

**1504.5.2 Frequency.** Spraying operations shall not be of a continuous nature and shall be incidental to the operation of the facility.

**1504.5.3 Ventilation.** Positive mechanical ventilation shall be provided in accordance with Chapter 5 of the Mechanical Code. Such system shall meet the requirements of the Mechanical Code for flammable vapor areas. Explosion venting is not required.

**1504.5.4 Electrical wiring.** Electrical wiring within 10 feet (3048 mm) of the floor and 20 feet (6096 mm) horizontally of the limited-spraying space shall be designed for Class I, Division 2 locations in accordance with the Electrical Code.

**1504.5.5 Portable fire extinguisher.** Limited-spraying space shall be provided with a portable fire extinguisher in accordance with FC1504.4.10.

## **SECTION FC 1505 DIP-TANK OPERATIONS**

**1505.1 General.** Dip-tank operations shall be conducted in accordance with this section and FC1503.

**1505.2 Location.** In Group A, I and R occupancies, dip-tank operations shall be conducted in a room designed for that purpose, protected throughout by a sprinkler system, and separated vertically and horizontally from other areas by construction having a fire resistance rating of not less than 2 hours, in accordance with the construction codes, including the Building Code.

**1505.3 Design and installation.** Dip tanks shall be designed and installed in compliance with the requirements of FC 1505.3.1 through 1505.3.6.

**1505.3.1 Construction.** Except as otherwise provided in FC1505.4 with respect to hardening and tempering tanks, dip tanks shall be constructed in accordance with this section, and NFPA 34. Dip tanks, including drain boards, shall be constructed of noncombustible material and their supports shall be sturdily constructed of metal, reinforced concrete or masonry.

**1505.3.1.1 Overflow.** Dip tanks greater than 150 gallons (568 L) in capacity or 10 square feet (0.93 m<sup>2</sup>) in liquid surface area shall be equipped with a trapped overflow pipe leading to an approved outdoor location. The bottom of the overflow connection shall not be less than 6 inches (152 mm) below the top of the tank.

**1505.3.1.2 Bottom drains.** Dip tanks greater than 500 gallons (1893 L) in liquid capacity shall be equipped with bottom drains that are arranged to automatically and manually drain the tank quickly in the event of a fire unless the viscosity of the liquid at normal atmospheric temperature makes this impractical. Manual operation shall be from a safe, accessible location. Where gravity flow is not practicable, automatic pumps shall be provided. Such drains shall be provided with traps and shall discharge to a closed, vented salvage tank or other approved location.

**Exception:** Dip tanks containing Class IIIB combustible liquids where the liquids are not heated above room temperature, and the process area is protected throughout by a sprinkler system.

**1505.3.2 Dipping liquid temperature control.** Protection against the accumulation of vapors, self-ignition and excessively high temperatures shall be provided for dip tanks in which dipping liquids are heated directly or heated by the surfaces of the object being dipped.

**1505.3.3 Dip tank covers.** Dip tank covers, if provided, shall be capable of manual operation and shall be automatic-closing by approved automatic-closing devices designed to operate in the event of fire. Dip tank covers shall be kept closed when tanks are not in use.

**1505.3.3.1 Materials.** Dip tank covers shall be constructed of noncombustible material or be of a tin-clad type designed in the same manner as fire doors.

**1505.3.3.2 Supports.** Chain or wire rope shall be utilized for cover supports or operating mechanisms.

**1505.3.4 Fire protection.** Dip-tank operations shall be protected in compliance with the requirements of FC 1505.3.4.1 and 1505.3.4.2.

**1505.3.4.1 Fire extinguishing equipment.** A fire extinguishing system shall be provided for the following dip tanks unless such dip tanks are provided with a dip tank cover in accordance with FC1505.3.3:

1. Dip tanks less than 150 gallons (568 L) in capacity or 10 square feet (0.93 m<sup>2</sup>) in liquid surface area.
2. Dip tanks containing a liquid with a flash point below 110°F (43°C), used in such manner that the liquid temperature could equal or be greater than its flash point from artificial or natural causes, and having both a capacity of more than 10 gallons (37.9 L) and a liquid surface area exceeding 4 square feet (0.37 m<sup>2</sup>).

**1505.3.4.2 Fire extinguishing system.** Dip tanks with a capacity of 150 gallons (568 L) or more, or a liquid surface area of 10 square feet (0.93 m<sup>2</sup>) or more shall be protected by a fire extinguishing system. Such fire extinguishing system shall be designed in accordance with NFPA 34.

**1505.3.5 Interlocks.** Dip tanks utilizing a conveyor system shall be arranged such that in the event of fire, the conveyor system shall automatically cease motion and the required tank bottom drains shall open.

**1505.3.6 Ventilation.** Mechanical ventilation of flammable vapor areas shall be provided in accordance with Chapter 5 of the Mechanical Code.

**1505.4 Hardening and tempering tanks.** Hardening and tempering tanks shall be designed and installed in compliance with the requirements of FC 1505.4.1 through 1505.4.5. Except as provided therein, hardening and tempering tanks shall not be subject to the requirements for dip tanks set forth in FC1505.

**1505.4.1 Construction.** Hardening and tempering tanks shall be constructed in accordance with FC 1505.3.1, 1505.3.1.1, 1505.3.1.2, 1505.3.2 and 1505.3.5.

**1505.4.2 Location.** Hardening and tempering tanks located in a room containing an industrial furnace shall be positioned to minimize the ignition risk from such furnace, and such tanks shall not be located on a combustible floor.

**1505.4.3 Hoods.** Hardening and tempering tanks shall be provided with a noncombustible hood and vent or other approved ventilation system that terminates outdoors. Such exhaust hood and vent shall serve to provide a path for heat and flames in the event of a fire in the tank. Such vent ducts shall be designed as flues, and clearances shall be maintained from combustible materials to minimize their ignition risk.

**1505.4.4 Fire extinguishing system.** Hardening and tempering tanks with a capacity exceeding 500 gallons (1893 L) or a liquid surface area exceeding 25 square feet (2.3 m<sup>2</sup>) shall be protected by a fire extinguishing system.

**1505.4.5 High temperature alarm.** Hardening and tempering tanks shall be equipped with a high-temperature limit switch arranged to sound an alarm when the temperature of the quenching medium reaches 50°F (10°C) below its flash point.

**1505.5 Operation and maintenance.** Facilities in which dipping operations are conducted shall be operated and maintained in compliance with the requirements of this section.

**1505.5.1 Sources of ignition.** Protection against sources of ignition shall be provided in accordance with FC1503.2.

**1505.5.2 Use of compressed air.** Compressed air shall not be used to fill the tank or agitate tank contents.

**1505.5.3 Portable fire extinguishers.** Dip tank rooms and areas shall be provided with portable fire extinguishers complying with the requirements of FC906 and rated for flammable and combustible liquid fires in extra (high) hazard environments.

**1505.6 Flow-coating operations.** Flow-coating operations shall be conducted in compliance with the design, installation, operation and maintenance requirements for dip tanks. For such purposes, the sump and any areas on which paint flows shall be considered to be the area of a dip tank. Finishing products shall be supplied by a gravity tank not exceeding 10 gallons (37.9 L) in capacity or by direct low-pressure pumps arranged to shut down automatically in case of fire by means of approved heat-activated devices.

**1505.7 Roll-coating operations.** Roll-coating operations shall comply with the requirements of FC1505.6. In roll-coating operations utilizing flammable or combustible liquids, sparks from static electricity shall be prevented by electrically bonding and grounding all metallic rotating and other parts of machinery and equipment and by the installation of static collectors or by maintaining a conductive atmosphere such as a high relative humidity.

## **SECTION FC 1506 POWDER COATING**

**1506.1 General.** Operations using finely ground particles of protective finishing material applied in dry powder form by fluidized bed, electrostatic fluidized bed, powder spray guns or electrostatic powder spray guns shall be conducted in accordance with this section. When

stationary electrostatic equipment is utilized, such operations shall additionally be conducted in accordance with FC1507.

**1506.2 Location.** Powder coating operations shall be conducted in spray rooms or spray booths located in accordance with FC1504.

**1506.3 Design and installation.** Powder coating operations shall be conducted in powder coating rooms and powder coating booths designed and installed in compliance with the requirements of this section.

**1506.3.1 Construction of powder coating rooms.** Powder coating rooms shall be constructed of noncombustible materials.

**1506.3.2 Construction of powder coating booths.** Powder coating booths shall be constructed in accordance with FC1504.3.2, except that booth assemblies listed for such purpose and constructed in accordance with such listing may be constructed of materials other than as required by FC1504.3.2.1.

**1506.3.3 Fire protection.** Powder coating rooms and booths shall be protected by fire protection systems in accordance with this section.

**1506.3.3.1 Fire extinguishing system.** Powder coating rooms and booths shall be protected throughout by a fire extinguishing system.

**1506.3.3.2 Flame detection system.** Automated powder coating application equipment shall be protected by an approved, supervised flame detection device capable of detecting the presence of flame within ½ second, that shall, upon activation, automatically initiate the following actions:

1. Shut down electrical power and compressed air supply to the powder coating operation, including the conveyor, ventilation, application, transfer and powder collection systems.
2. Close segregation dampers in associated ductwork to interrupt airflows from application equipment to powder collectors.
3. Activate a local alarm audible within the powder coating room or booth and surrounding area.

**1506.3.4 Drying, curing and fusion equipment.** Drying, curing and fusion equipment shall comply with the requirements of FC Chapter 21.

**1506.3.5 Ventilation.** Exhaust ventilation and powder recovery systems shall be provided in accordance with Chapter 5 of the Mechanical Code.

**1506.4 Operation and maintenance.** Facilities in which powder coating operations are conducted shall be operated and maintained in compliance with the requirements of this section.

**1506.4.1 Housekeeping.** Powder coating areas, including horizontal surfaces such as ledges, beams, pipes, hoods, booths and floors, shall be kept free from the accumulation of powder coating dusts.

**1506.4.2 Cleaning.** Surfaces shall be cleaned in such a manner as to avoid scattering dust or creating a dust cloud. Vacuum cleaning equipment shall be of a type approved for use in a hazardous location.

**1506.4.3 Spark-producing metals.** Magnetic separators, filter-type separators, or other approved means shall be installed or used to prevent iron or other spark-producing metals from being introduced into the powders or the powder-coating operation.

**1506.4.4 Preheating parts.** The temperature of the parts heated prior to coating shall not exceed the ignition temperature of the powder to be used.

**1506.4.5 Sources of ignition.** Protection against sources of ignition shall be provided in accordance with FC1503.2. Static bonding and grounding or other appropriate precautions shall be taken to minimize the possibility of ignition by static electrical sparks generated by powder transport, application and recovery systems.

**1506.4.6 Portable fire extinguishers.** Powder coating rooms and booths shall be provided with portable fire extinguishers complying with the requirements of FC906 and rated for flammable and combustible liquid fires in extra (high) hazard environments.

## **SECTION FC 1507 ELECTROSTATIC SPRAY-FINISHING EQUIPMENT**

**1507.1 General.** Electrostatic spray-finishing equipment used in connection with paint-spraying and paint-detearing operations shall be of an approved type, and shall be designed, installed, operated and maintained in accordance with this section.

**1507.2 Location and clear space.** A space of at least twice the maximum potential sparking distance shall be maintained between the workpiece being painted or deteared and any electrodes, electrostatic atomizing heads or conductors.

**Exception:** Such distance is not required to be maintained between workpieces and portable electrostatic spray-finishing equipment listed for use in Class I, Division 1 locations.

**1507.3 Design and installation.** Electrostatic spray-finishing equipment used in connection with paint-spraying and paint-detearing operations shall be designed and installed in compliance with the requirements of this section.

**1507.3.1 Construction.** Electrodes and electrostatic atomizing heads shall be of approved construction, rigidly braced or otherwise supported to prevent movement and insulated from grounding by nonporous and noncombustible insulators.



**Exception:** Such bracing and insulation is not required to be provided for portable electrostatic spray-finishing equipment listed for use in Class I, Division 1 locations.

**1507.3.1.1 Separation.** Electrostatic spray-finishing equipment shall be separated from other areas and operations by means of booths, fencing, railings or other barriers. Fencing, railings or other barriers shall be of conductive material, adequately grounded, and shall be placed not less than 5 feet (1524 mm) from the electrostatic spray-finishing equipment.

**Exception:** Such barrier and separation distance is not required to be provided for portable electrostatic spray-finishing equipment listed for use in Class I, Division 1 locations.

**1507.3.2 Fire protection.** Electrostatic spray finishing operations shall be protected by fire protection systems in compliance with the requirements of this section.

**1507.3.2.1 Fire extinguishing system.** Spraying areas shall be protected throughout by a fire extinguishing system complying with FC Chapter 9.

**1507.3.2.2 Flame detection system.** Automated liquid electrostatic spray-finishing operation areas shall be protected by the installation of an approved, supervised flame detection system capable of detecting the presence of flame within ½ second, which shall, upon activation, automatically initiate the following actions:

1. Shut down electrical power to the electrostatic spray-finishing equipment, including the coating material delivery system and the conveyors into and out of the flammable vapor area, and terminating all spray-finishing operations.
2. Activate a local alarm in the spraying area, and the building fire alarm system if such a system is provided.

**1507.3.3 Interlocks.** Electrostatic spray-finishing equipment shall be provided with emergency shut down devices and interlocks in compliance with the requirements of this section.

**1507.3.3.1 Emergency shutdown.** Electrostatic spray-finishing equipment shall be equipped with automatic controls operating without time delay to disconnect the power supply to the high-voltage transformer and signal the operator under any of the following conditions:

1. Stoppage of ventilating fans or failure of ventilating equipment from any cause.
2. Stoppage of the conveyor carrying articles past the high-voltage grid.
3. Occurrence of a ground fault or an imminent ground fault at any point of the high-voltage system.

4. Reduction of clearance below that required in FC1507.2.

**1507.3.3.2 Ventilation interlock.** Electrostatic spray-finishing equipment utilizing hand-held sprayers shall be interlocked with the ventilation system for the spraying area so that the equipment cannot be operated unless the ventilating system is in operation.

**1507.3.4 Ventilation.** Mechanical ventilation in the flammable vapor area shall be provided in accordance with Chapter 5 of the Mechanical Code.

**1507.4 Operation and maintenance.** Facilities in which electrostatic spray-finishing operations are conducted shall be operated and maintained in compliance with the requirements of this section and FC 1503.3 and 1503.4, and FC 1507.4.1 through 1507.4.3.

**1507.4.1 Cleaning.** Insulators shall be kept clean and dry. Drip plates and screens upon which paint is deposited shall be removable and shall be regularly removed and cleaned. Grounding connections for the electrostatic spray-finishing equipment shall be regularly cleaned so as to prevent overspray.

**1507.4.2 Signage.** Durable signs that provide the following cautions and information shall be conspicuously posted:

1. Designate the process zone as dangerous with respect to fire and accident.
2. Restrict access to qualified personnel only.
3. Indicate the grounding requirements for all electrically conductive objects in the flammable vapor area, including persons working in that area.
4. Indicates the maximum potential sparking distance as set forth in FC1507.2.

**1507.4.3 Sources of ignition.** Transformers, power packs, control apparatus and all other electrical components of the electrostatic spray-finishing equipment, except high-voltage grids and electrostatic atomizing heads and connections, shall be located outside of the flammable vapor area or shall comply with the requirements of FC1503.2.

## **SECTION FC 1508 ORGANIC PEROXIDES AND DUAL-COMPONENT COATINGS**

**1508.1 General.** Spraying operations involving the use of organic peroxides and other dual-component coatings shall be conducted in accordance with this section and FC1503.

**1508.2 Design and construction.** Spraying operations involving the use of organic peroxides and other dual-component coatings shall be conducted in a facility designed and installed in accordance with this section.

**1508.2.1 Construction.** Spraying operations shall be conducted in spray booths complying with the requirements of FC1504.3.2.

**1508.2.2 Fire extinguishing systems.** Spray booths shall be protected throughout by a sprinkler system.

**1508.2.3 Equipment.** Spray guns and related equipment shall be of a type manufactured for such use.

**1508.2.4 Pressure tanks.** Separate pressure vessels and inserts shall be used for the application of the resin and the organic peroxide, and shall not be interchanged. Organic peroxide pressure tank inserts shall be constructed of stainless steel or polyethylene.

**1508.3 Operation and maintenance.** Facilities in which spraying operations involving the use of organic peroxides and other dual-component coatings are conducted shall be operated and maintained in compliance with the requirements of this section and FC 1503.3 and 1503.4, and FC 1508.3.1 through 1508.3.8.

**1508.3.1 Contamination prevention.** Organic peroxide initiators shall not be contaminated with foreign substances.

**1508.3.2 Spilled material.** Spilled organic peroxides shall be promptly removed so there are no residues. Spilled material absorbed by using a noncombustible absorbent shall be promptly removed from the premises and disposed of lawfully.

**1508.3.3 Residue control.** Materials shall not be contaminated by dusts and overspray residues resulting from the sanding or spraying of finishing materials containing organic peroxides.

**1508.3.4 Handling.** Handling of organic peroxides shall be conducted in a manner that avoids shock and friction that produces decomposition and violent reaction hazards.

**1508.3.5 Mixing.** Organic peroxides shall not be mixed directly with accelerators or promoters.

**1508.3.6 Personnel qualifications.** Personnel working with organic peroxides and dual-component coatings shall be specifically trained to work with these materials.

**1508.3.7 Storage.** The storage of organic peroxides shall be in accordance with FC Chapter 39.

**1508.3.8 Sources of ignition.** Only nonsparking tools shall be used in areas where organic peroxides are stored, mixed or applied.

## **SECTION FC 1509 INDOOR MANUFACTURING OF REINFORCED PLASTICS**

**1509.1 General.** Indoor manufacturing processes involving spray or hand application of reinforced plastics and using more than 5 gallons (19 L) of resin in a 24-hour period shall be conducted in accordance with this section and FC1508.

**1509.2 Design and installation.** Indoor manufacturing processes involving spray or hand application of reinforced plastics shall be conducted in a facility designed and installed in compliance with the requirements of this section.

**1509.2.1 Fire protection.** Resin application areas shall be protected throughout by a sprinkler system. The sprinkler system design shall not be less than that required for Ordinary Hazard, Group 2, with a minimum design area of 3,000 square feet (279 m<sup>2</sup>). Where the materials or storage arrangements are required by other regulations to be provided with a higher level of sprinkler system protection, the higher level of sprinkler system protection shall be provided.

**1509.2.2 Ventilation.** Mechanical ventilation shall be provided in resin application areas in accordance with Chapter 5 of the Mechanical Code. The ventilation rate shall be adequate to maintain the concentration of flammable vapors in the resin application area at or below 25 percent of the lower flammable limit (LFL).

**Exception:** Mechanical ventilation is not required for buildings that are unenclosed for at least 75 percent of the perimeter.

**1509.2.2.1 Local ventilation.** Local ventilation shall additionally be provided inside of workpieces where personnel will be under or inside of the workpiece.

**1509.2.3 Sources of ignition.** Sources of ignition in resin application areas shall comply with the requirements of FC1503.2.

**1509.3 Operation and maintenance.** Facilities in which indoor manufacturing processes involving spray or hand application of reinforced plastics are conducted shall be operated and maintained in compliance with the requirements of this section and FC 1503.3 and 1503.4.

**1509.3.1 Handling of excess catalyzed resin.** A noncombustible, open-top container shall be provided for disposal of excess catalyzed resin. Excess catalyzed resin shall be drained into the container while still in the liquid state. Enough water shall be provided in the container to maintain a minimum 2-inch (51-mm) water layer over contained resin.

**1509.3.2 Control of overchop.** In areas where chopper guns are used, exposed wall and floor surfaces shall be covered with paper, polyethylene film or other approved material to allow for removal of overchop. Overchop shall be allowed to cure for not less than 4 hours prior to removal of the wall and floor coverings. Used coverings shall be placed in a noncombustible container and removed from the premises.

**1509.3.3 Storage and use of hazardous materials.** Storage and use of organic peroxides shall be in accordance with FC1508 and FC Chapter 39. Storage and use of flammable and

combustible liquids shall be in accordance with FC Chapter 34. Storage and use of unstable (reactive) materials shall be in accordance with FC Chapter 43.

## **SECTION FC 1510 FLOOR FINISHING OPERATIONS**

**1510.1 Scope.** All floor finishing operations using Class I or Class II liquids shall be conducted in accordance with FC 1510.1.1 and 1510.1.2. Floor finishing operations exceeding 168 square feet (15.6 m<sup>2</sup>) and using Class I or Class II liquids shall additionally be conducted in accordance with FC 1510.2 through 1510.5.

**1510.1.1 Prohibitions.** It shall be unlawful to:

1. Use flammable floor finishing products with a flash point below 80°F (27°C) indoors.
2. Smoke, use or maintain open flames, including torches, in rooms or other indoor areas in which floor finishing products are being stored and/or in which floor finishing operations are being conducted.
3. Conduct floor finishing operations in rooms or other indoor areas occupied by anyone other than the individuals engaged in such operations.

**1510.1.2 General requirements.** All floor finishing operations shall comply with the following requirements:

1. Floor finishing operations shall be conducted in accordance with the manufacturer's instructions for the storage, handling and use of floor finishing products.
2. Flammable or combustible liquids or mixtures, other than floor finishing products, stored, handled or used in connection with floor finishing operations shall be stored, handled or used in accordance with FC Chapter 34.
3. Floor finishing product containers shall be closed when not in use.
4. Empty containers of floor finishing products and all other floor finishing product waste and residue shall be removed from the premises not less than once a day.
5. Gas burners, pilot lights, electrical devices, electronic devices and other sources of ignition in flammable vapor areas shall be shut off prior to commencing work.
6. At least one portable fire extinguisher with a minimum rating of 20-B shall be readily accessible during floor finishing operations. The travel distance to such extinguisher shall not exceed 30 feet (9144 mm).
7. Quantities of floor finishing products at a site shall not exceed the amount necessary for that day's operations. In no circumstance shall such quantity exceed 20 gallons (76 L).

**1510.2 Occupancy of premises during operations.** Floor finishing operations shall not be conducted in occupied rooms or other areas. If occupants are allowed to return to the premises in which the floor finishing operations were conducted before the surfaces have dried, fire safety precautions shall be maintained and the occupants shall be given written instructions in regard thereto. Floor finishing operations shall not be conducted in a Group A or Group M occupancy while the premises is open to the public.

**1510.3 Sources of ignition.** No electrical equipment or device that is a potential source of ignition of floor finishing product vapors, including switches and outlets, shall be operated during floor finishing operations. Precautions shall be taken prior to commencing work to prevent inadvertent operation of such equipment or devices, such as shutting down electrical power, unplugging equipment and taping over switches and outlets.

**1510.4 Mechanical system operation.** Heating, ventilation and air-conditioning systems shall not be operated during floor finishing operations and for the period of time thereafter until the surfaces have dried.

**1510.5 Ventilation.** To prevent the accumulation of flammable vapors, mechanical ventilation at a minimum rate of 1 cubic foot per minute per square foot ( $0.00508 \text{ m}^3/\text{s}/\text{m}^2$ ) of the area being surfaced or finished shall be provided. Such ventilation shall be by approved temporary or portable means. Vapors shall be exhausted outdoors. Such ventilation equipment shall be kept in operation while the floor finishing operations are being conducted and for a period of time thereafter to allow for the exhaust of the vapors.

**1510.6 Retail sale.** Floor finishing products with a flash point below 80°F (27°C) shall be provided with a conspicuous and durable tag bearing the words, “WARNING: INDOOR USE OF THIS PRODUCT IS PROHIBITED IN NEW YORK CITY.” A sign shall be conspicuously posted in the area in which the floor finishing product is displayed, warning that the product is prohibited for indoor use in New York City.