

SPRAY POWDER COATING OPERATION

Minimum Requirements

These guidelines are based on NFPA (National Fire Protection Association) Standards. The primary standards used to develop these guidelines include:

- NFPA 33 (Standard for spray finishing of flammable/combustible materials)
- NFPA 70 (National Electric Code)
- NFPA 10 (Standard for Portable Fire Extinguishers)
- NFPA 101 (Life Safety Code)

Location of Spray Application Operations

All powder coating spray operations shall be confined to a spray booth, spray room or spray area as defined below.

No spray powder coating operations shall be conducted in any building that is classified as an assembly, educational, institutional or residential occupancy unless the spray coating operation is separated both vertically and horizontally from all surrounding areas by construction having a 2-hour fire resistance rating.

Special Note:

Within these guidelines, unless otherwise indicated, the guidelines apply to an enclosed spray booth. The guidelines for an open spray area and open front booth are discussed in certain sections of these guidelines.

Construction and Design of Spray Booth

The spray booth shall be separated from other operations conducted by the business owner (i.e. the office, shop area, tool/equipment storage areas, etc.) by walls, floors and ceilings having a minimum fire resistance rating of 1-hour. A clear space of not less than 3 feet shall be maintained on all sides and above the spray booth. This space shall be kept free of any storage or combustible materials and combustible construction. All doors into the spray room shall have a fire resistance rating of not less than 1-hour.

All walls and ceilings within the spray booth shall be designed and constructed such that there are no pockets that can allow combustible residues and materials to accumulate. The walls/ceilings shall be smooth without any projections or obstructions which could interfere with airflow through the booth. The spray booth walls and ceilings shall be easily accessible for cleaning purposes.

Aluminum shall not be used for structural support members of the walls or ceilings of the spray booth. Aluminum shall also not be used for ventilation ductwork associated with a spray booth.

Structural sections of spray booths shall be sealed with a caulk or sealant to minimize air leakage from the spray booth.

Conveyor openings that are necessary for transporting or moving work parts into and out of the spray area shall be as small as practical.

Movement of Powered Vehicles

Powered vehicles shall not be moved into or out of a spray booth or operated within a spray booth unless the spray application operation or process is stopped and the ventilation system is maintained in operation.

SPRAY POWDER COATING OPERATION

Minimum Requirements, continued

Electrical and Other Sources of Ignition

All electrical wiring and electrical equipment in the spray booth, except those objects required by the process to be at high voltage, shall be electrically grounded. All electrical wiring, lights and switches located within a powder coating spray booth shall be approved for use in Class II Division 1 locations.

All wiring, light fixtures and electrical switches located outside of an enclosed spray booth but within 3 feet of the booth openings (i.e. walk-through doors, overhead doors, etc.) shall be approved for use in Class II Division 2 locations.

If spray applications operations are conducted in a closed top, open faced or open front booth or room, any electrical wiring or equipment located outside of the spray room/spray booth but within 10 feet horizontally or 3 feet vertically from the open front, open face or door openings shall be approved for use in Class II Division 2 locations. These openings within the spray room/spray booth include any openings that exist for passage of a conveyor system through the spray area.

This 10-foot horizontal requirement and 3-foot vertical requirement for Class II Division 2 wiring exists if the ventilations system of the booth is NOT interlocked with the spray application equipment. (Interlocked shall mean the spray application equipment cannot be operated unless the exhaust ventilation system is in operation and functioning as designed and the spray application is automatically stopped if the exhaust ventilation system fails or is shut down.)

If the exhaust ventilation system is interlocked with the spray equipment, the wiring, light fixtures and electrical switches within 3 feet vertically and 5 feet horizontally from the open face, open front booth/spray room and within 3 ft vertically and 5 ft horizontally of any door opening into this spray room/spray booth shall be approved for use in Class II Division 2 locations.

If spray finishing of powder coating materials is performed within an open section (i.e. no enclosure walls surrounding the spray area) of a building, all electrical wiring and equipment located outside of the spray area but within 20 feet horizontally and 10 feet vertically and not separated from the area by one-hour fire rated construction, must be approved for Class II Division 2 locations.

Exception to the Above Rule Requiring Explosion-Proof Light Fixtures

It is not necessary for light fixtures that provide illumination to enclosed or partially enclosed spray booths to be approved for use in Class II Division 1 locations if the light fixtures are recessed outside the walls and ceilings of the spray booth. The light fixtures shall be completely recessed outside the interior walls/interior ceilings of the booth and the illumination from the fixture shall be through heat-treated glass, wired glass or hammered wired glass panels. These panels shall be completely sealed to prevent vapor, mists, residues, dust and deposits from traveling outside the interior of the spray booth. Panels for light fixtures shall be separated from the fixture to prevent the surface temperature to prevent the panel from exceeding 200° F (93 ° C).

If the light fixtures are recessed outside of an enclosed spray booth, however, the light switches or wiring are located within 3 feet of an exterior opening in the spray booth, the wiring and switches within that 3 foot radius must be approved for Class II Division 2 locations.

If the light fixtures are recessed in the walls/ceilings of an open face or open front spray booth, or if the fixtures are located within a spray booth which has an opening for a conveyor system to pass through the spray area, the wiring and switches located outside but within 10 feet horizontally and 3 feet vertically of these openings must be approved for use in Class II Division 2 locations if the spray equipment is not interlocked with the ventilation system. If the ventilation system and spray equipment are interlocked, the wiring and switches located outside of the open face, open front booth and/or conveyor opening, the wiring within 5 feet horizontally and 3 feet vertically of these openings must be approved for Class II Division 2 locations.

SPRAY POWDER COATING OPERATION

Minimum Requirements, continued

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 the cords meet the following minimum conditions:

- They are approved for extra hard usage
- They are equipped with a grounding conductor
- They are connected to terminals or conductors in an approved manner
- They are listed for use Class II Division 2 locations.

Open flames, spark producing equipment or processes and equipment whose exposed surfaces exceed the auto ignition temperature of the material being sprayed shall not be located in a spray area (i.e. area where wiring is required to be Class II Division 1) or in any surrounding area that is classified as Class II Division 2 locations. This would include heating equipment, air compressors or any other type of electrical device or heating device that is not approved for use in Class II Division 1 or Class II Division 2 locations.

Other Sources of Ignition

When the object or material being coated is preheated in an oven, the controls shall be set so that the surface temperature of the material does not come within 50° (28° C) of the auto ignition temperature of the powder being used within the powder coating operation. The auto ignition temperature of the powder coating material can be found on the Material Safety Data Sheet, which should be present within the powder coating facility.

Ventilation, Dust Collection and Explosion Protection

Where air suspended powder/overspray is conveyed by ductwork to a remote recovery system, sufficient airflow shall be provided in the ductwork to maintain the powder concentration in the ductwork at not more than ½ of the minimum explosive concentration of the powder in use.

Explosion Suppression

Enclosures shall be listed for the specific application or shall be designed to resist the destructive effects of an internal dust explosion. Any enclosure such as a spray booth, dust collection system, powder recovery device or other enclosure that is not listed for use in areas where combustible powder coating application is to be conducted, shall be supplied with explosion suppression venting or an explosion suppression system shall be installed within the enclosure in accordance with NFPA 69 (i.e. Standard on Explosion Prevention Systems).

The ventilation system/dust collection system located within an enclosure shall be adequate to confine overspray the booth and the recovery system at all times.

Protection for Automated Powder Application Equipment

Automated powder application equipment shall be protected by listed optical flame detection equipment installed and supervised in accordance with NFPA 72. The optical flame detection equipment shall, in the event of ignition, react to the presence of flame within ½ second and the system shall perform the following functions:

- Stop any conveyor into and out of the spray area
- Shut off the ventilation system

SPRAY POWDER COATING OPERATION

Minimum Requirements, continued

- Shut off application transfer and powder collection equipment
- Close all dampers in ductwork to interrupt airflow from application equipment to powder collectors (i.e. all dampers within ductwork for dust collection and recovery systems shall be self-closing and activated by the flame detection system)
- Disconnect power to the high voltage elements in the spray area and de-energize the system

Operation and Maintenance

The area surrounding the spray area, including all horizontal surfaced such as ledges, beams, pipes, hoods, and booth floors etc. shall be cleaned on a frequent basis to prevent the accumulation of powder on these surfaces. In an effort to prevent a potential dust explosion, vacuums approved for use in Class II Division 2 locations should be used to maintain powder accumulation to a minimum in powder coating/powder storage area. Compressed air should NOT be used at any time to clean up powder within a spray booth or powder storage area. Placing combustible powder in suspension increases the probability of a chain reaction of dust explosions.

Magnetic equipment combined with visual inspections should be implemented near all combustible powder dust collection/recovery systems to prevent potential metal and/or spark-producing material from entering dust collection systems and/or combustible dust recovery systems.

No smoking or open flames signs in large lettering on contrasting color background shall be posted at all powder coating areas and powder storage rooms.

Powder Storage

All powder in excess of a one shift or one-day supply should be stored within a powder storage room separated from the balance of the building by 1-hr fire-rated walls, floors and ceilings. All wiring present within the powder storage room should be approved for use in Class II Division 2 locations. All wiring outside of the storage room but within three feet of the door openings should be approved for Class II Division 2 locations.

Bonding and Grounding

All conveyor systems traveling through a spray area should be grounded and all parts placed on the conveyor system should be properly bonded to the metal conveyor system. In an effort to maintain a proper bond to the conveyor system, all powder coating overspray should frequently be removed from hooks, clamps and similar pieces of equipment which are used to support parts traveling through a powder coating spray area on the conveyor system.

Waste Disposal

All combustible materials, solvent-soaked cloths/rags, etc. should be placed inside metal waste receptacles with self-closing lids and the contents of all metal waste containers should be removed from the building on a daily basis and disposed of in an exterior receptacle. This should help to reduce the probability of spontaneous ignition of these combustible materials.

Life Safety

Enclosed spray booths shall be provided with at least 2 means of egress in accordance with NFPA 101 (Life Safety Code). The travel distance from the spray booth to the exterior of the building should not exceed 75 feet. There should be no obstructions within the path to the exit door, and the exit doors shall open with the path of travel to the exterior of the building.

SPRAY POWDER COATING OPERATION

Minimum Requirements, concluded

Illuminated exit signs should be present within the building. Emergency lighting units shall be present if one or more of the following conditions exist:

- The building is windowless or any portion of the shop is located below ground level
- The building is 2 stories or more in height
- The occupancy is subject to 50 or more persons above or below ground level
- The entire building is subject to having 300 or more persons within the structure

Heating Units

All furnaces or heaters within a powder coating operation should be UL listed, AGA listed, or tested by a reputable testing laboratory to confirm that the heaters are capable of functioning as intended. Heating equipment should be installed in accordance with the manufacturer's recommendations.

Wood stoves are not permitted in this type of commercial occupancy.

There should be no open flames, infrared heaters, and spark-producing equipment or heat sources (including radiators) inside the powder coating spray room/spray booth, or within the powder storage room.

Heating units should be separated from the spray booth by one hour fire-rated construction with no openings less than eight feet above the floor between the furnace room and the spray booth. All doors into the furnace room should be from the outside the building. Heat ducts should terminate flush with the interior walls/ceilings of the spray booth. They should not extend into the room or booth.

The cold air return for the heating unit should be obtained from outside the building. No cold air return should come from the spray booth or powder storage room. The duct outlet into the spray booth should contain a non-combustible filter to prevent overspray from accumulating.

Air filters that are a part of the wall or ceiling assembly shall be listed as Class I or Class II in accordance with UL 900, test performance of air filter units.

Portable Fire Extinguishers

At least one, 10-pound ABC portable fire extinguisher should be present for each 1,000 square feet within the building. The maximum travel distance to reach a portable fire extinguisher should not exceed 30 feet.

All portable fire extinguishers should be wall-mounted in a visible and easily accessible area. Efforts should be made to mount portable fire extinguishers in the path of travel to the exterior of the building. This should prevent individuals from attempting to reach a portable fire extinguisher then becoming trapped by a fire within the structure.

All portable fire extinguishers should be serviced by an outside fire extinguishing service contractor on annual basis.

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