SPRAY FINISHING OPERATIONS

LOSS CONTROL BULLETIN

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The spray application of flammable and combustible materials presents a significant fire hazard. Spray operations should not be conducted outside of an approved spray booth. A properly designed and constructed spray booth will help control the hazards.

A properly designed booth will control the hazards associated with overspray residues and safely remove flammable and combustible vapors from the spray booth that could lead to a fire or explosion. A spray booth must meet the requirements outlined in NFPA 33 "Spray Application Using Flammable or Combustible Materials."

Fires involving spray operations develop quickly and will likely become an intense fire with large amounts of heat and smoke, so,the location of the spray booth is an important factor. The booth should be where there are adequate egress options and adequate access for fire-fighting. All areas of the booth must be easily accessible to facilitate cleaning.

Specific maintenance procedures, including a daily inspection, should be developed to monitor the performance of the spray booth. Where spray operations are extensive, the spray booth should be located in a separate building or in an area that is separated from all other operations by fire-rated construction.

Spray application of flammable/combustible liquids shall not be conducted in any building that is classified as assembly (restaurants, theaters, or other structure where the number of occupants at any one time may exceed 50 people), educational, institutional (house of worship or correctional facility) unless the spray finishing operations are 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 two hours.

Residential living spaces above or within the same building where spray finishing operations are being conducted is not permitted.

GENERAL CONSTRUCTION

The walls, doors, and ceilings must be non-combustible construction and must be securely and rigidly mounted or fastened. All walls and ceilings shall be designed and constructed such that there are no pockets that can allow combustible residues and materials to accumulate.

The walls and ceilings should be smooth without any projections or obstructions that could interfere with airflow within the booth. Structural sections of the booth can be sealed with caulk or sealant to help minimize air leakage.

Ideally the floor should be made of non-combustible material. However, limited combustible material or combustible material completely covered by a non-combustible material is allowed.

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The spray operations shall be separated from other operations by a minimum of at least 3 feet. An alternative is to separate the operations by use of a partition, wall or floor/ceiling assembly having a one-hour fire rating. A clear space of 3 feet must be maintained on all sides and above the booth. This space must be kept clear of any storage of combustible materials.

VENTILATION

Each spray booth shall be provided with mechanical ventilation that should be in operation during the spray operations. It is recommended that the spray apparatus be interlocked with the ventilation system so that the spray finishing cannot be performed without the ventilation system operating.

Exhaust ducts must vent to the outside of the building. They must be constructed of minimum 28-gauge sheet steel. The ductwork should follow the most direct route and cannot penetrate a fire wall.

There must be a minimum 18-inch clearance from the exhaust ductwork to unprotected combustible materials. The discharge should be directed away from any fresh air intakes so as not to bring flammable or combustible vapors back into the building. The discharge should also be a minimum of 6 feet from any exterior wall or roof. Exhaust ducts must be provided with doors or panels that will allow for inspection, maintenance, cleaning, and access to fire protection devices.

The exhaust fan must be a non-ferrous material and driven by fully enclosed belts with the motor located outside the spray booth. If the motor can't be located outside the booth, the motor must be explosion-proof (designed for Class I, Division 1 locations).

Filters for the system need to be installed before the fan so the spray residue does not reach the motor and possibly ignite or result in a build-up of residue that could cause overheating of the motor. Filters should be of an approved type (i.e., UL-listed) and be accessible and removable for cleaning. Filters must be replaced before there is excessive air-flow restriction.

ELECTRICAL

Electrical wiring and fixtures inside booths must be explosion-proof, conforming to the provisions of the National Electric Code for Class I, Division 1 locations. When spraying operations are conducted in a fully enclosed booth, any opening from the booth must have explosion-proof wiring and fixtures within 3 feet of the opening.

In an open-faced booth, if the ventilation system and spray equipment are not interlocked, all electrical wiring and fixtures within 10 feet of the open front and 3 feet of any other opening must be explosion-proof. There must also be no open flames or spark-producing equipment within these same areas. Any electrically conductive objects in the spray area must be grounded. This also applies to any personnel entering the area.

Portable electric lights shall not be used in any spray area while spray operations are being conducted. As an alternative to explosion-proof lighting, the walls or ceilings in the booth can be fitted with vapor-tight, wired, tempered glass with the bulbs located behind them, outside the spray booth.

Flexible power cords may be permitted but they must be approved for extra-hard usage and be equipped with a grounding conductor. The cords must be provided with explosion-proof seals for liquid application or dust-tight seals for powder applications where the cord will enter a junction box, fitting, or enclosure.

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FLAMMABLE LIQUIDS STORAGE AND MIXING ROOMS

The quantity of flammable liquids allowed to be stored in the vicinity of spraying operations shall be limited to the amount required for one shift. Liquids should be stored in UL-listed safety containers, not in open containers. Dispensing or transferring of liquids should be done in a spray area with the ventilation in operation or in an approved mixing room.

Mixing rooms shall be non-combustible construction and the interior surfaces should be smooth and designed to facilitate ventilation and cleaning. The mixing room should be designed such that it can contain a spill. Continuous mechanical ventilation shall be provided. Electrical requirements are the same as those of an enclosed spray booth.

A suitable number of fire extinguishers shall be located in the mixing room. Waste containers for flammable liquids shall be constructed of conductive material and must be bonded and grounded. UL-listed or FM-approved waste containers must be present in mixing rooms and other areas of the building where rags or waste impregnated with flammable/combustible liquids or spray material may be present.

OPERATIONS AND MAINTENANCE

Formal maintenance procedures should be developed following the spray booth manufacturer's guidelines. Overspray filters shall be inspected after each use and clogged filters discarded and replaced.

All discarded overspray filters, residue scrapings, and debris contaminated with residue should be removed from the premises at the end of the day and placed in a non-combustible container with a tight-fitting lid to reduce the potential for spontaneous combustion. Any employee clothing contaminated with spray material should be removed from the premises overnight.

The spray booth must be kept free of excessive amount of combustible residue buildup. Any cleaning operations utilizing flammable or combustible liquids must be conducted inside the spray booth with the ventilation system operating.

Any equipment that utilizes flammable or combustible liquids must be bonded and grounded. "No Smoking" or "No Open Flames" signs should be posted in all spray areas, mixing rooms, and flammable liquid storage rooms.

Tools and devices used for cleaning the interior of the booth must be made of non-sparking materials. Ductwork and fan blades should be checked regularly for excessive residue accumulation and any buildup removed promptly.

To eliminate the potential for spontaneous ignition, different types of coating materials should not be applied until the booth and ductwork have been adequately cleaned. The safety data sheets (SDS) for the products being sprayed should be reviewed for potential incompatibility.

FIRE PROTECTION

Spray areas must be protected by an approved automatic fire protection system. Spray areas and mixing rooms may be protected by water supplied from the domestic water system or from a fixed fire suppression system.

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Booths protected by fire protection systems should have the sprinkler heads protected from overspray by placement of thin paper bags over the heads. These bags should be held in place by rubber bands or string. The paper bags shall be replaced frequently so that heavy deposits of residue do not accumulate.

POWDER COATING OPERATIONS

Powder coating operations shall be conducted in an approved booth. The Minimum Explosive Concentration (MEC) for the powder must be known to ensure that the exhaust system is properly designed for the product being applied. The object being coated needs to be maintained at least 50 degrees Fahrenheit below the auto-ignition temperature of the powder.

The area surrounding the spray area shall be maintained to prevent the accumulation of powder. Surfaces in and around the booth shall be cleaned in a manner that does not scatter the powder or create dust clouds. If vacuums are used to assist in cleaning, they must be approved for use in hazardous locations.