Northbridge® Insurance

# RISK INSIGHTS

## SPRAY PAINT BOOTHS

## HOW SAFE IS YOUR SPRAY PAINT BOOTH?

**There are generally two ways a spray paint booth is built. The first is a pre-engineered spray paint booth produced by a recognized Original Equipment Manufacturer (OEM). OEM follows design requirements outlined in *NFPA 33 - Standard for Spray Application Using Flammable or Combustible Materials*. The second is a home-built spray paint booth that is very unlikely to include all design requirements as per NFPA 33, and therefore may not be readily accepted by an authority having jurisdiction (AHJ) or commercial insurer.**

The primary objective of a **properly designed** spray paint booth is to **help prevent fire and explosion** by containing the flammable vapours, removing them effectively, and controlling ignition sources. Spray paint booths are not designed to protect the worker from overexposure to hazardous products. It is vital for employees to wear approved respiratory protection.

The three common airflow designs of a spray paint booth are conventional open faced, cross draft, and down draft. The latter two designs are common in spray paint rooms. It is important to determine which airflow system is best for your specific operation as it will affect your operating costs, quality of work, and overall workplace safety.

### Containing flammable vapours

Containing flammable vapours limits the chances of vapours igniting. To help contain vapours properly, implement the following rules:

- Store only a one-day supply of flammable and combustible liquids in the spray paint booth area.
- Do not have more than three approved flammable liquid storage cabinets in the process area.
- Mix flammable or combustible liquids in a paint mixing area or spray paint booth area only.

### Removing flammable vapours

After containing flammable vapours, proper removal is essential in helping to prevent fires. Proper removal is achieved by having an adequate ventilation system in the spray paint booth. The mechanical ventilation of the spray paint booth should be capable of removing vapours and mists to a safe location, as well as confining and controlling combustible residues, dusts, and deposits. The ventilation system should be able to limit the vapour and mist concentration to below 25% of the lower flammable limit (LFL), which is the minimum concentration that is ignitable.

To help ensure adequate ventilation, the exhaust ducts are to meet several standards, including the following:

- Ducts and fasteners are constructed of steel and properly supported.
- There is 18 inches (0.45 m) of clearance between ducts and unprotected combustible material(s).
- The ducts are exhausted directly outside.
- The ducts do not penetrate a firewall.
- The discharge point of the exhaust ducts is at least 6 ft (1.8 m) from an exterior wall or roof.
- The discharge point is not directed towards any combustible construction or unprotected opening within 25 ft (7.6 m).

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## Controlling ignition sources

Electrical wiring and equipment are the main ignition sources in spray paint booths. By controlling these items, you are taking significant steps towards eliminating ignition sources and preventing fires.

Electrical wiring and equipment must be suitable for Class I, Division 1 or Class II, Division 1 locations (whichever is applicable).

Electrical wiring and equipment located outside of the booth, but within 20 ft (6.1 m) horizontally and 10 ft (3 m) vertically, must be suitable for Class I, Division 2 or Class II, Division 2 locations (whichever is applicable).

Do not use extension cords or other electrical plug-in cords in a spray paint booth or within the above dimensions outside of a booth.

Light fixtures, as with all electrical wiring and equipment, are to meet the same requirements for their class and division. Ensure the following:

- Light fixtures are serviced from outside of the spray paint booth area.
- Panels for either light fixtures or observation are made of heat-treated glass, wired glass, or hammered-wired glass, and then sealed to confine vapours, mists, residues, dusts, and deposits to the spray area.
- Do not use portable electric light fixtures in a spray paint booth.

> Avoid fires and explosions by complying with all standards to contain and remove vapours and by controlling ignition sources. Utilize a pre-engineered spray paint booth and follow safety procedures and proper maintenance schedules to help ensure the safety of your business.

## Construction

Construction of the spray paint booth, as well as precautions taken by the worker, can help ensure that fires do not occur.

- Use a pre-engineered spray paint booth to help ensure all safety requirements and construction are in place.
- Equip all spray paint booths with an approved fire suppression system. Read section *Fire Suppression System for Spray Paint Booths* below.
- Make all parts, including filters, readily removable and accessible to ensure proper cleaning can take place.
- Verify all components of the spray paint booth are made of non-combustible material.
- Smoothen the interior surface to prevent buildup of paint residue and to allow for proper ventilation and clean-up.

## Precautions

- Bond or ground workers and electrically conductive parts to prevent the creation of any static sparks.
- Schedule proper cleaning on a regular basis for the spray paint booth and ventilation system so buildup of paint residue does not occur.
- Perform regular maintenance of the entire spray paint system.

**The leading causes of fire in spray paint booths include the following:**

- Use of spark-producing equipment, such as cutting, welding, and grinding near the spray area
- Friction caused by overheated bearings on the exhaust fan shaft or by the rubbing of exhaust fan blades against overspray deposits on walls of the exhaust duct
- Arcing electrical equipment
- Spontaneous combustion of paint residue. Refer to the Safety Data Sheet (SDS) for specifics on coatings used.
- Discharge of static electricity

**NOTE:** Avoid fires and explosions by complying with all standards to contain and remove vapours and by controlling ignition sources. Utilize a pre-engineered spray paint booth and follow safety procedures and proper maintenance schedules to help ensure the safety of your business. *NFPA 33 - Spray Application using Flammable or Combustible Materials* outlines the requirements for a properly installed spray paint booth.

# FIRE SUPPRESSION SYSTEM FOR SPRAY PAINT BOOTHS

For spray paint booths and rooms using water-borne or solvent-borne paints, it is important to install an automatic fire protection system that is regularly inspected and maintained. Newly engineered or designed spray paint booths and rooms can readily accept an automatic fire protection system.

Spray paint booths have numerous safety features to help control ignition sources and to contain and remove flammable vapours from construction, filters, the exhaust, and more.

Spray paint booths—including the exhaust system, paint mixing area, and other areas—are subject to combustible overspray and vapour accumulations. They are to be protected by an approved automatic fire suppression system. In the event a fire occurs, the fire suppression system helps to extinguish the fire preventing direct damage to the booth and the building.

The typical fire protection systems for this type of hazard involve an automatic sprinkler system or an alternate fire protection system, such as dry chemical.

**NOTE:** This risk topic pertains to the manual application of coatings versus automatic spray applications. Additional risk techniques are required for automatic spray applications and can be referenced under NFPA 33.

## Automatic sprinkler system

Some special requirements for spray booths include the following:

1. The sprinkler system is wet pipe, deluge, or pre-action to ensure water can be discharged on the fire in the shortest possible amount of time.
2. The booth, plenum, and exhaust ductwork are fire protected. There is also fire protection for the paint mixing area if it is installed as a separate room.
3. The system design for styrene cross-link thermoset resin application areas or powder coating operations is commensurate with an Ordinary Hazard (Group 2) occupancy per NFPA 13. The system design for all other areas is commensurate with an Extra Hazard (Group 2) occupancy per NFPA 13 to ensure sufficient water supply for all sprinklers likely to open during a fire incident. The design is undertaken by an accredited automatic sprinkler contractor.
4. A separate control valve is installed at the spray paint booth. This allows isolation of the spray booth fire protection without negating the overall building sprinkler protection.
5. Sprinkler heads are covered with cellophane or thin paper bags to protect them from over-spray residue. Over time, the bags become loaded, brittle, and cracked. Change the overspray protection at regular intervals.

## Alternate fire suppression systems

Ensure alternate fire suppression systems are capable of discharging contents into the entire protected area simultaneously. They can be one of the following types:

1. Dry chemical (NFPA 17)
2. Carbon dioxide (NFPA 12)
3. Gaseous agent (NFPA 2001)
4. Foam water sprinkler system (NFPA 16)
5. Water mist (NFPA 750)

**Additional practices:**

- Have an exhaust ventilation interlock for all spray painting systems. This requires the ventilation system to be turned on before the air supply/spray gun can be activated.
- For all types of systems, the activation of the fire suppression system triggers a local alarm. Make sure the fire protection system with a fire alarm system is monitored in accordance with NFPA 72.
- Air make-up and spray booth exhaust systems are not to be interlocked with the fire alarm system and to remain functional during fire alarm conditions. The exception being when the automatic fire protection system type requires ventilation to be discontinued.

**NOTE:** For more information on the requirements for the design and installation of automatic fire sprinkler systems in spray paint booths, please consult *NFPA 13 - Standard for the Installation of Sprinkler Systems and NFPA 33 - Standard for the Spray Application using Flammable and Combustible Materials*.

> Fires in spray paint operation areas can develop very quickly, have high heat release rates, and produce large volumes of toxic smoke. Regular maintenance and housekeeping help to control the fire risk.

## MAINTENANCE OF SPRAY PAINT BOOTHS

Fires in spray paint operation areas can develop very quickly, have high heat release rates, and produce large volumes of toxic smoke. Regular maintenance and housekeeping help to control the fire risk.

The interval of the maintenance schedule will depend on the usage and overall condition of the spray paint booth. The following components of the booth require regular maintenance, as per the National Fire Protection Association (NFPA) Fire Protection Handbook.

### Walls, ceiling and floor

A routine maintenance program accounts for the periodic removal of overspray residue from the walls, ceiling, and floor of the booth. A peel coat pre-applied to the walls and ceiling aids in the ease of combustible overspray removal.

### Filters

Replace filters as often as recommended by the manufacturer. Remove contaminated filters from the building as soon as they're replaced, or keep immersed in water until disposal, as they present a serious spontaneous combustion hazard.

Install a manometer that can notify you when paint booth filters need to be changed. This is especially important when filters have to be changed more often than recommended by the manufacturer due to the type or volume of work.

**NOTE:** Always operate the spray paint booth with the filters in place.

### Exhaust ducts

The ductwork requires routine cleaning to keep it clear of residue buildup. Remove accumulation inside the ductwork using non-sparking tools as vapour pockets may be ignited.

**NOTE:** Paint residue accumulation may present a serious spontaneous combustion hazard. Refer to the SDS for specific information on coating.

### Light covers

- Ensure all light covers are in place and cracked covers are replaced immediately.
- Seal all light covers to create a barrier between the spray paint booth and the lights/electrical wiring.

### Fire protection

- Ensure an accredited service sprinkler contractor inspects and tests the dry chemical protection systems on a semi-annual basis.
- Verify that an accredited sprinkler contractor inspects and tests the automatic sprinkler protection on an annual basis.

### General housekeeping

- Confirm that quantities of combustible or flammable materials does not exceed a one-day supply in the spray paint booth area.
- Prohibit open flames, spark-producing equipment, and any exposed surface exceeding the ignition temperature of the material being sprayed. This includes smoking in and around the spray paint operation.
- Use electrical interlocks or grounding cables to prevent electrostatic ignition.
- Keep the area clean of debris. Remove all unused items such as rags and waste. Dispose of rags in a portable metal waste can with a self-closing cover located outside of the spray paint booth.

For more information on making your business safer, contact our Risk Services team at **1.833.692.4111** or visit us at **www.northbridgeinsurance.ca**.

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