

**Spray Finishing****SPP# 1910.107****Quick Reference**

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**1.0 Purpose**

The purpose of this safety policy and procedure is to establish guidelines for spray finishing when using flammable and/or combustible materials.

**2.0 Scope and Applicability**

Paint spraying operations within the North Carolina Department of Transportation (NCDOT) are usually performed in detached buildings or areas or in spray booths. The paint spray mixtures contain combustible and flammable components. Therefore, precautions must be exercised during spray finishing operations to minimize hazards associated with combustible and flammable materials.

This safety policy and procedure provides guidelines for spray finishing when using flammable and/or combustible materials. It includes provisions for training, spray booth construction, and spray booth housekeeping guidelines. Additionally, guidelines are presented on illumination, ventilation, Personal Protective Equipment (PPE), drying of spray painted items, and storage of flammables and combustibles. Discussion is also presented on pipe, hose and container inspection guidelines, and disposal of cleaning solvents.

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## SAFETY POLICY & PROCEDURE

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This document also details the areas of responsibility for managers/unit heads, supervisors, and employees within NCDOT.

This safety policy and procedure affects NCDOT employees in the:

- Equipment Unit
- Highway Maintenance
- Ferry Division
- Traffic Engineering
- Sign Shops
- Bridge Maintenance
- Aviation Unit

Additionally, this safety policy and procedure applies to employees in any other operation who are exposed to hazards associated with spray finishing using flammable and/or combustible materials.

### 3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.107).

### 4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, NCDOT will operate spray paint booths to minimize employee exposure to flammable and/or combustible materials and to minimize fire hazards. When these hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Spray Finishing will be implemented.

These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

### 5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Spray Finishing. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

### 6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Spray Finishing.

#### 6.1 Definitions

##### **Aerated Solid Powders**

Aerated solid powders shall mean any powdered material used as a coating material which shall be fluidized within a container by passing air uniformly from below. It is common practice to fluidize such materials to form a fluidized powder bed and then dip the part to be coated into the bed in a manner similar to that used in liquid dipping. Such beds are also used as sources for powder spray operations.

##### **Approved**

Shall mean approved and listed by a nationally recognized testing laboratory (i.e., Underwriters Laboratories [UL]).

##### **Dry Spray Booth**

A spray booth not equipped with a water washing system. A dry spray booth may be equipped with:

- Distribution or baffle plates to promote an even flow of air through the booth
- Overspray dry filters to minimize dusts
- Overspray dry filters to minimize dusts or residues entering exhaust ducts
- Overspray dry filter rolls designed to minimize dusts or residues
- Powder collection systems when dry powders are being sprayed

##### **Electrostatic Fluidized Bed**

A container holding powder coating material which is aerated from below 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.

##### **Fluidized Bed**

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

##### **Spray Booth**

A power-ventilated structure provided to enclose or accommodate a spraying operation to confine and limit the escape of spray, vapor, and residue, and to safely conduct or direct them to an exhaust system.

### **Spraying Area**

Any area in which dangerous quantities of flammable vapors or mists, or combustible residues, dusts, or deposits are present due to the operation of spraying processes.

### **Waterwash Spray Booth**

A spray booth equipped with a water washing system designed to minimize dusts or residues entering exhaust ducts and to permit the recovery of overspray finishing material.

## **6.2 General Provisions**

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Booth Construction
- Housekeeping
- Illumination
- Ventilation
- PPE
- Storage of Flammables and Combustibles
- Pipes, Hoses, and Containers
- Cleaning and Residue Disposal
- No Smoking Signs

### **6.2.1 Training**

Employees who perform spray finishing activities will be trained in the proper and safe operation of spray finishing operations. Additionally, they will be trained in:

- Why spray booths are used
- Hazards of combustible and flammable materials
- Types of spray finishing operations in NCDOT
- Understanding what PPE is required
- Storage and handling requirements for combustible and flammable materials

### **6.2.2 Booth Construction**

Spray booths will be constructed of steel, concrete, masonry, or other non-combustible material. The structure will be adequately supported to ensure stability and will be designed to sweep air currents toward exhaust outlets and will meet all requirements of CFR 1910.107.

Figure 1 illustrates a typical spray booth installation. In the event an approved spray booth is not available, spray finishing or spray painting may be done outside (out of doors) in open air with the supervisor's approval.

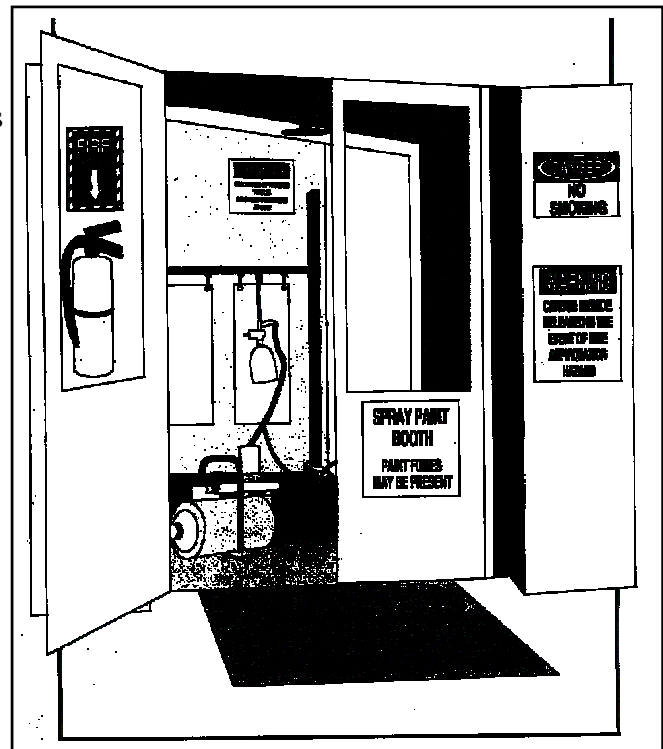


Figure 1

### 6.2.3 Housekeeping

Spray booth interiors will be kept clean with 3 feet on all sides of the booth clear of storage and combustible materials.

### 6.2.4 Illumination

Spray booths will be illuminated by protected lighting devices such as recessed or covered lighting fixtures. Clear panels may be used to cover fluorescent lights to protect them from overspray. All lighting fixtures will be mounted in locations that are isolated or not likely to be broken or damaged by the operation.

All wiring will be placed in conduit boxes or in fittings containing no taps, splices, or terminal connections.

### 6.2.5 Ventilation

All spraying areas will be equipped with mechanical ventilation adequate to remove flammable vapors, mists, or powders to a safe location and to confine and control combustible residue. Ventilation systems will operate during the entire spray operation and afterward until vapors are safely removed. Exhaust will be directed outside of buildings into areas where it will not accumulate in pockets and cause fire hazards.

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Fans used to ventilate spray rooms will be constructed to reduce the chance of friction fires by using nonferrous or nonsparking material at friction points. Fan motors will be mounted outside booths or ducts and will be protected by a cage or other device to prevent damage from other operations.

Refer also to [SPP# 1910.301, Electrical Related Safe Work Practices](#), for additional details on electrical safety requirements.

### 6.2.6 Personal Protective Equipment (PPE)

Respirators are required for any spray finishing other than very minor touch-up procedures. Where negative pressure respirators are worn, the user must be properly enrolled in the NCDOT Respirator Program. (See [SPP# 1910.134](#) for specific requirements.)

Safety footwear (steel toe shoes/boots) will be required when there is a potential for foot injury from rolling or falling objects or from objects piercing the sole. Safety helmets (hard hats) will be required when head injury by falling materials or objects could occur.

Affected employees will use appropriate eye and/or face protection when exposed to eye or face hazards from flying particles, liquid chemicals, molten metals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation. (See [SPP# 1910.132](#) for specific PPE requirements.)

Hand protection will be required when hazards such as skin absorption of harmful substances, severe cuts, lacerations, abrasions, puncture wounds, harmful extremes of temperature, or burns from thermal or chemical sources are present.

### 6.2.7 Drying

Equipment, parts, and/or components that have been sprayed will be placed in a designated area for drying that is free from all sources of ignition.

### 6.2.8 Storage of Flammables and Combustibles

Storage of flammables and combustibles will comply with [SPP# 1910.106, Flammable and Combustible Liquids](#). The quantity of flammables and combustibles located inside the spray booth will not exceed the expected amount for use during the particular operation.

### 6.2.9 Pipes, Hoses and Containers

All pipes, hoses, and connectors will be checked periodically to ensure they are functioning properly. All frayed, worn, or damaged equipment will be repaired or replaced immediately before operations can begin or continue.

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Only approved containers will be used to store, transport, or spray materials. Spray gun containers will be constructed of metal, with properly sealing lids, and designed with relief valves to prevent air pressure buildup.

When flammable or combustible material is transferred from one container to another, the containers will be properly electrically grounded or bonded to prevent static electricity discharges.

### 6.2.10 Cleaning and Residue Disposal

All cleaning solvents will be restricted to those having flashpoints of not less than 100°F. Solvents normally used to clean spray equipment are not restricted by this. All cleaning of equipment will be done inside the spray booth with proper ventilation in operation.

Residue, stripping, and other debris will be disposed of daily in closed metal containers with tightly fitting covers and stored in a safe location until removed from the facility.

### 6.2.11 No Smoking Signs

All spray booth areas will have posted "No Smoking" signs large enough in contrasting colors (as shown in Figure 2) to adequately warn all employees of the hazardous operation. Warning signs will be cleaned or replaced as required to ensure they are readable at all times. Refer to [SPP # 1910.145, Accident Prevention Signs and Tags](#), for additional signage details.



Figure 2

## 6.3. Specific Responsibilities

### 6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of proper equipment, supplies and training. They will be also responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance with spray finishing through their auditing process.

### 6.3.2 Supervisors

Supervisors will not allow any employee who has not received the required training to perform any of the tasks or activities associated with spray finishing. Supervisors will ensure that precautions are taken to ensure that employees are protected from sources of ignition, any possible drift of sprayed materials, and other hazards.

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Supervisors will be responsible for communicating appropriate needs to managers/unit heads and/or supervisors.

Supervisors will ensure that employees are provided with the appropriate PPE as necessary for their job.

Supervisors will ensure that only qualified employees are assigned or permitted to perform duties related to the hazards of spraying operations using flammable and/or combustible materials.

Supervisors will ensure that hazards caused by broken, worn, defective, or otherwise inappropriate supplies, materials, tools, or equipment are repaired before the work begins.

Supervisors will perform daily pre-shift checks for visibly damaged, worn, or frayed pipes, hoses, and connectors and will conduct more detailed periodic inspections to ensure safe operations.

### 6.3.3 Employees

It is the responsibility of each employee to identify potential hazards when required to work with or near spraying operations using flammable and/or combustible materials and report immediately those suspected hazards to his or her supervisor.

It is also the responsibility of each employee to refrain from work involving exposure to potential hazards of spraying operations using flammable and/or combustible materials without instruction/training specific to the hazards of the tasks involved.

Employees will report to their supervisors all frayed, worn, damaged, or otherwise defective equipment.

### 6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure including surveys of spray finishing operations. Safety and Loss Control will assist in developing or securing required training. Safety and Loss Control will also work with Purchasing and Central Equipment Unit to ensure that all newly purchased spray paint booths comply with current safety regulations.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.



## Spray Finishing Flowchart

