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Spray finishing operations

Allianz Risk Consulting

Risk bulletin

Paint has been used for thousands of years as a decorative, protective or functional additive to finished products. The application of paint using various air spray processes has become the norm. With these processes, comes a multitude of hazards. The major exposures associated with paint spray processes are fire, explosion and health hazards.

Over the past eighty years, a wide variety of processes have been developed for spraying materials. The basic process, involving hand-held air-atomizing spray guns, is still widely used. However, the latest technology involves computer-controlled robot manipulators equipped with electrostatic atomizers that can be integrated into a totally automated system.

Spray equipment is used extensively to apply paint in industry, and increasingly around homes. The equipment is also used by industry to dispense chemical and to apply greases and oils.

A typical spray system consists of four basic components:

- The reservoir containing the material to be dispensed
- A propellant that is usually compressed air (see the section on Airless Spray Processes)
- A nozzle that expels the mixture of the propellant and the material being dispensed
- A connecting hose or piping between the reservoir and the nozzle

The following checklists for the typical spray processes can be useful in controlling the hazards associated with spray finishing operations. Always follow the instructions and directions provided by the equipment manufacturer.

Spray finishing operations safety checklist conventional spray process

Equipment	Yes	No
Does the spray area have non-combustible walls and ceilings?		
Is the booth protected with one fire sprinkler for every 80 to 100 square feet of booth floor area and sprinklers in the exhaust duct?		
Is the spray area/booth electrical equipment (lights and fans) designed for a flammable vapor atmosphere?		
Are "NO SMOKING" signs posted in areas where flammable liquids and combustible dusts are used?		
Are lighting units physically isolated from the spray area by wired glass or heat treated glass panel?		
Is the exhaust fan interlocked with the spray equipment so the fan must be on for the spray equipment to work?		
Are flammable/combustible liquids mixed or dispensed in the spray area/booth with the ventilation on?		
Are flammable/combustible liquids mixed or dispensed in a separate mixing room?		
Is the quantity of flammable/combustible liquids in the spray area/booth limited to one day's supply?		
Is the quantity of flammable/combustible liquids in the spray area/booth limited to 25 gallons of Class 1A liquids plus 120 gallons of Class 1B, 1C, 2 or 3 liquids?		

Spray finishing operations safety checklist hot spray process

Equipment	Yes	No
Is the heater system designed for low-pressure steam, hot water or electricity?		
Does the paint heater have thermostatic controls and a temperature gauge?		
Do the paint container, heating jacket and pump discharge have pressure-relief valves?		
Are electric heaters listed for paints and are they properly maintained?		
Are heaters located outside areas susceptible to combustible residue accumulation?		
Are hose lines designed for system pressures and temperatures?		
Are agitators driven by air, water, low-pressure steam or electricity?		

Spray finishing operations safety checklist airless (high pressure) process

Equipment	Yes	No
Are pumps, hoses, tanks, fittings, guns and nozzles designed for the applicable pressures?		
Is there an automatic shut-off in the event of excess working and discharge pressures?		
Are hoses kinked/bent?		
Are the hoses properly inspected for deterioration, leakage and/or weakening?		
Are the objects being painted and spray guns electrically bonded together or connected to a common ground?		
Is there a diffuser to reduce the velocity and impact of the paint stream on the spray gun?		
Is there an automatic check valve in the gun to prevent a high-pressure jet of paint from being released?		
Is fluid pressure released prior to removing a spray nozzle from the gun or a gun from the hose?		
Are proper goggles/glasses and gloves being worn by operator?		
Are operators properly trained for the process?		
Is safety warning information affixed to the paint pump?		

Spray finishing operations safety checklist electrostatic and fluidized powder coating

Equipment	Yes	No
Is the electric hand-powder coating equipment designed to eliminate sparks, which could ignite powder-air mixtures?		
Are fluidized beds and equipment of approved types?		
Is electrical equipment interlocked with the ventilation system?		
Are the high voltage circuits designed to not result in a shock hazard or ignite a powder-air mixture when a discharge produced nears the bed electrodes or contacts a grounded object?		
Unless properly listed, is all electrical equipment other than the charging electrodes and connections located outside the coating area?		
Are objects being coated in electrical contact with the conveyor to ensure proper grounding?		
Are electrically conductive objects in the coating area bonded and grounded?		
Is a warning posted indicating the need for grounding objects?		

Spray finishing operations safety checklist powder coating

Equipment	Yes	No
Is the coating enclosure completely enclosed, of smooth non-combustible construction and ventilated?		
If spray booths are used for coating, are they listed or approved for combustible dust operations?		
Are all metal parts properly grounded and bonded?		
Does the temperature of the part being coated exceed the ignition temperature of the powder?		
If spray booths are used for coating, are they listed or approved for combustible dust operations?		
Are non-deposited, air-suspended powders removed via exhaust ducts to a powder recovery system?		
Has re-circulated /reconditioned air used as input air returned to an acceptable level?		
Does the re-circulating air system signal the operator and shut down the operation if the air is below safe levels?		
Are surfaces periodically cleaned to eliminate the accumulation of powders?		

Spray finishing operations safety checklist drying processes

Equipment	Yes	No
Does the drying system conform to recognized national standards?		
If there is open flame drying, is it located outside the spray area?		
If next to the drying area, is it equipped with an interlocking ventilation system?		
Is the drying area properly ventilated prior to starting the heating system?		
Is there a safe atmosphere at ignition sources?		
Does the heating system automatically shut down in the event of ventilation failure?		
Are electrical connections and wiring located outside areas where spray residue may accumulate?		
Are metallic parts properly grounded and bonded?		
Is there a warning sign posted and attached to drying apparatus indicating ventilation is to be maintained and spraying not conducted in the area?		
Is all equipment within 18 inches of the floor level approved for Class I, Division 2 locations?		

These checklists are not intended to supersede any recommendations or guidance from the equipment manufacturer.

References

Occupational Safety and Health Administration. Department of Labor. Regulations Pertaining to Labor. 29 CFR 1910.107. Washington, DC: The Office of the Federal Register, 1994

National Fire Protection Association – NFPA 33 – Spray Application Using Flammable and Combustible Materials