



نظام الشارقة للسلامة والصحة المهنية
Occupational Safety & Health Sharjah

حكومة الشارقة
هيئة الوقاية والسلامة
Government of Sharjah
Prevention And Safety Authority



Guideline

Spray Finishing

OSHJ-GL-14

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1 Introduction

Spray finishing refers to the process where a liquid substance is converted into a mist or aerosol to apply a surface coating onto an object or surface.

Spray finishing is used in different industries, including but not limited to:

- Auto body shops;
- Sign painting shops;
- Furniture, door, and appliance manufacturing facilities;
- Metal fabrication shops;
- Shipbuilding facilities;
- Sandblasting and coating facilities;
- Maintenance, equipment repair and workshops.

2 Purpose and Scope

This Guideline document has been developed to provide information to entities to assist them in complying with the requirements of the Occupational Safety and Health System in Sharjah.

To achieve compliance in the Emirate of Sharjah, all entities are required to demonstrate a standard of compliance which is equal to or higher than the minimum acceptable requirements outlined in this Guideline document.

3 Definitions and Abbreviations

Entities:	Government Entities: Government departments, authorities or establishments and the like in the Emirate. Private Entities: Establishments, companies, enterprises and economic activities operating in the Emirate in general.
Risk:	Is the combination of likelihood of the hazard causing the loss and the severity of that loss (consequences).
Risk Assessment:	The systematic identification of workplace hazards and evaluation of the risks associated. This process takes existing control measures into account and identifies and recommends further control measures where required.
Hazard:	Anything that has the potential to cause harm or loss (injury, disease, ill-health, property damage etc).
Competence:	The combination of training, skills, experience and knowledge that a person has and their ability to apply all of them to perform their work.
Spray Booth:	A spray booth is a specially designed enclosure used to house spray painting equipment and isolate expelled vapour that is generated during a spray application process. Spray booths are typically intrinsically safe and built to be fire and explosion proof.

Surface Coatings:	Includes surface coatings that are dried or cured by infrared or UV light, chemical hardeners or other means and include paint, solvents, sealants, resin, varnish, oils, waxes, lacquers and other surface coatings which may contain isocyanates.
Isocyanates:	Isocyanate is the functional group with the formula $R-N=C=O$. Organic compounds that contain an isocyanate group are referred to as isocyanates.
Organic Compounds:	Organic compounds are a type of chemical compound where one or more than one carbon covalently bonded with each other and with other atom like nitrogen, oxygen, halogen etc.
Volatile Organic Compounds (VOCs):	VOCs are a group of carbon-based products that are able to vaporize at room temperature, sources include materials such as paints, varnishes or sealants
Manufacturer's Manual:	The instructions, procedures and recommendations which are provided by the manufacturer to ensure the safe operation, maintenance and repair of the equipment.

4 Roles and Responsibilities

4.1 Entity Responsibilities

- Undertake a risk assessment, identify hazards, assess the risks to safety and health and identify adequate control measures;
- Ensure that the adequate control measures identified during risk assessment are in place to prevent risks to employees' safety and health;
- That potential chemical exposure to employees is as low as reasonably practicable from the selection of surface coatings;
- Ensure that the spray finishing equipment is safe and suitable for the intended purpose of use;
- Maintain, inspect and test to ensure spray finishing equipment is safe to use by competent persons and works in accordance with the manufacturer's manual;
- Provide employees who conduct spray finishing with information, instruction, supervision and training;
- Provide employees with suitable personal protective equipment;
- Provide employees who undertake spray finishing with health surveillance and regular medical check ups;
- Ensure that emergency procedures are in place to deal with emergencies and employees are trained on these procedures.

4.2 Employee Responsibilities

- Not endanger themselves or others;

- Follow precautionary control measures to ensure work activities associated with spray finishing are performed safely and without risk to health;
- Cooperate with the entity and receive safety information, instruction, supervision and training;
- Report any activity or defect which they know are likely to introduce risks to the safety and health of themselves or that of any other person.

5 Guidelines

Spray finishers can be exposed to organic compounds in excessive concentrations. Surface coatings can contain isocyanates, which are powerful sensitizers that can cause negative health effects through inhalation or dermal contact. Exposure can occur at any stage of the spray finishing process from hazardous substances, including but not limited to:

- Paints;
- Solvents;
- Powders;
- Lacquers;
- Paint strippers;
- Adhesives;
- Surface preparation products;
- Rust removers;
- Other surface coatings.

The main source of isocyanate exposure is from spray finishing. Exposure may also occur during preparation of surface coatings, storage, clean up, and disposal of waste substances. The entity should reduce the risk of exposure by providing, including but not limited to:

- Properly designed spray booths;
- Safe working procedures;
- Appropriate personal protective equipment;
- Regular checks to confirm that the controls are working properly.

Further information on hazardous substances can be found in OSHJ-CoP-11: Management of Hazardous Substances.

5.1 Planning

The entity must plan their work activities, ensuring they are appropriately supervised and carried out safely. Planning includes conducting a risk assessment, the selection of work equipment and preparation for emergencies.

The entity must assess spray finishing activities and the hazards arising from these work activities and implement effective control measures to reduce the exposure to employees and others.

The entity shall ensure those affected by spray finishing understand the hazards and risks associated, control measures in place, emergency procedures and what they must do to comply with it.

The entity is required to assess the risks in the workplace and take all reasonably practicable precautions to ensure the safety of employees and others who could be affected by spray finishing activities. In general, to control the risks from spray finishing the entity should ensure that either:

- Spray finishing is conducted in a designed spray booth; or
- Any spray finishing work conducted outside a designed spray booth or as a non-routine activity must be adequately controlled and conducted in a location that is isolated from any other operations and employees.

5.2 Risk Assessment

Before carrying out any spray finishing, the entity shall conduct risk assessment by considering the following risk factors, including but not limited to:

- The hazardous properties of the substance, including health effects;
- The amount or quantity of the substance used and the level of exposure;
- The type, duration and frequency of exposure;
- The operating conditions and application process;
- The selection, maintenance and inspection of spray finishing equipment;
- The effects of mixing substances and how they interact;
- The information, instruction, supervision and training required to demonstrate competence;
- Provision of suitable personal protective equipment;
- Emergency procedures and response.

Further information on identifying hazards and how to conduct risk assessments can be found in OSHJ-CoP-01: Risk Management and Control.

5.3 Control Measures

The primary hazards of spray finishing include fires and explosions from flammable surface coatings, as well as exposures to chemical hazards and toxic substances. Spray finishing work is frequently conducted in confined spaces that, if not properly ventilated, can cause illness to employees.

5.3.1 Substitution

Substitution simply means using a less hazardous substance. Flammable liquids may be substituted by non-flammable liquids. Water-based surface coatings are increasingly available and can be a suitable alternative to surface coatings containing VOCs.

5.3.2 Containment and Separation

The most effective way to control the flammable vapours arising from spray finishing processes is to use a ventilated spray booth, its purpose is to:

- Prevent the escape of vapours into the workplace;
- Prevent contamination of the workplace by overspray;
- Protect the health of employees;
- Provide separation from sources of ignition and to prevent the spread of fire;
- Prevent contamination of the workplace environment.

There are many different designs of spray booths. An open-fronted bench-type spray booth is generally appropriate for small objects or materials. Larger items of equipment are usually sprayed in enclosed, walk-in booths.

5.3.3 Control of Ignition Sources

It is impossible to avoid flammable atmospheres during the spraying of flammable surface coatings, therefore the control of ignition sources is essential. When spray finishing is not taking place, flammable residues, contaminated materials, drying and cleaning operations may still present a fire risk.

Ignition sources, include but are not limited to:

- Unprotected electrical equipment;
- Heating appliances;
- Smoking materials;
- Welding and other similar hot work activities;
- Grinding;
- Sparks generated by the discharge of static electricity;
- Internal combustion engines.

Precautions should be taken to prevent vapours being ignited by the discharge of static electricity. In particular, non-conducting footwear and clothing made of synthetic fibres can cause incendive electrostatic sparks, especially if they are worn in areas with non-conducting floors. Electrostatic build-up may be reduced by using anti-static footwear and anti-static clothing and floors.

5.3.4 Labelling, Handling and Storage of Substances

Packages and outer layers of packaging must be clearly labelled and securely fixed to the package.

The entity should ensure Safety Data Sheets are provided when purchasing hazardous substances or preparations. Safety Data Sheets provide suitable information to allow the users of substances or mixtures to use it safely.

Further information on labelling, handling and storage of substances can be found in OSHJ-CoP-11: Management of Hazardous Substances.

5.3.5 Spray Booths

Spray booths are designed, manufactured and installed to contain all hazardous substances and to keep employees, facilities and the environment safe. Additional measures, include but not limited to:

- For work activities in a spray booth with the potential of an oxygen-deficient atmosphere, it is compulsory that air fed breathing apparatus is worn;
- Respirators must always be worn by anyone present in the spray booth during spraying, gun cleaning and throughout the clearance time. Respirators may not provide the appropriate protection and are only rated for short continuous wear time;
- Use visor-type, air-fed breathing apparatus with a lowflow indicator, or half-mask breathing apparatus, with constant airflow supply, when spraying isocyanate-based products;
- All breathing apparatus users should be trained to wear it correctly, maintain it, and test that it works properly before every use. Air supplied to the breathing apparatus should be uncontaminated and in sufficient quantity to protect the user. Where there is a risk of surface coatings splashing, coveralls and suitable gloves should be worn;
- The time ventilation takes to remove atomised mist is known as the 'clearance time'. The ventilation should remain on for a sufficient period of time to allow the booth to purge;
- Spray booths should be operated at negative air pressure to prevent atomised spray finishing substances escaping into the workplace. Provide an indicator to show that negative pressure is being maintained and checked daily.

5.3.6 Spray Booth Ventilation

Many of the surface coatings used in spray finishing are flammable liquids which, when sprayed, may create a flammable atmosphere leading to the risk of fire or explosion.

The purpose of ventilation, includes but is not limited to:

- Draw overspray away from the operator;
- Control flammable and hazardous vapours;
- Collect vapours, droplets and solid particles;
- Filter the air before it is discharged.

The ventilation should be sufficient to prevent the formation of dangerous concentrations of flammable vapours. The filter used in the ventilation system needs to be cleaned and/or changed in accordance with manufacturer's manual.

5.3.7 Spray Finishing Outside of Spray Booths

Where it is not possible to use a spray booth to contain the spray finishing work, the entity should ensure the following, including but not limited to:

- Adequate ventilation via natural ventilation and/or a local exhaust system is provided to prevent the accumulation of flammable or toxic fumes;
- All control measures are identified and in place to protect employees and operations from spray finishing hazards;
- An exclusion zone is established to prevent unprotected people from being exposed to atomised spray particles and to isolate the spray finishing process from all sources of ignition;
- The implementation of any other control measures identified in the task specific risk assessment, should be controlled under a permit to work.

5.4 Maintenance, Inspection and Cleaning of Equipment

5.4.1 Maintenance and Inspection

The entity should ensure that a maintenance and inspection programme is implemented to maintain spray finishing equipment and ensure it is working as designed and intended including but not limited to;

- Maintenance and inspection is performed as recommended in the manufacturer's manual;
- Spray finishing equipment is visually examined prior to use by a competent person to identify damaged or worn equipment and that joints, connections and hoses are in good condition and not leaking;
- Air-fed breathing apparatus should be examined as recommended in the manufacturer's manual;
- The air supply quality should be periodically tested;

The entity shall record and retain maintenance and inspection records.

5.4.2 Cleaning of Equipment

Spray gun cleaning should use an extracted gun-cleaning machine or spray wash guns in the spray booth with the extraction turned on.

5.5 Waste Disposal

The entity shall treat the waste that is generated from spray finishing activities as hazardous waste and must be stored and disposed accordingly.

Further information on waste disposal can be found in OSHJ-CoP-19: Waste Management.

5.6 Health Surveillance

The entity should provide health surveillance for spray finishers, including but not limited to:

- A pre-exposure questionnaire and lung function tests for new employees prior to working with surface coatings;
- Periodic lung function testing and a questionnaire conducted based on the findings of the risk assessment;

- Skin checks for dermatitis.

The entity is required to report any medically confirmed cases of occupational breathing illness and/or dermatitis.

Risk assessment should be used to identify any need for health surveillance. Health surveillance can be used to help identify early signs of occupational illness and where additional control measures are required.

Further information on health surveillance can be found in OSHJ-CoP-14: Management of OSH Illness and Disease.

5.7 Personal Protective Equipment

The entity should ensure that employees are provided with suitable personal protective equipment (PPE), including but not limited to:

- Based on the findings of a risk assessment of the work activities to ensure the correct selection of appropriate personal protective equipment;
- Faces, eyes, heads, hands, feet and all other exposed parts must be protected with suitable PPE during spray finishing;
- Air-fed breathing apparatus;
- Respirators, including full-face respirators, and loose-fitting hood respirators must be used during spray finishing operations;
- Any other PPE identified as being required in the risk assessment.

Further information on PPE can be found in OSHJ-GL-07: Personal Protective Equipment.

6 Training

The entity shall ensure that all employees involved in spray finishing are adequately trained in languages and in a format that employees understand, including but not limited to:

- Spray finishing procedures and safe systems of work;
- The safe handling, mixing, use and storage of hazardous substances;
- Those undertaking spray finishing and supervisors are provided with adequate information on the hazards associated with spray finishing;
- The safe selection, use, maintenance and storage of PPE;
- Specific training in the use of RPE;
- Emergency response procedures.

Periodic refresher training should be conducted to ensure employees competency is maintained, including but not limited to:

- Where training certification has expired;
- Where identified as part of a training needs analysis;
- Where risk assessment findings identify training as a measure to control risks;

- Where there is a change in legal requirements;
- Where incident investigation findings recommend refresher training.

The entity must record and maintain accurate training records of OSH training provided to employees.

Further information on training can be found in OSHJ-GL-26: Training and Competence.

7 Emergency Preparedness and Response

The entity should be prepared for emergencies that may occur during the handling, mixing, use and storage of substances used in work activities involving spray finishing, including but not limited to:

- Emergency response personnel are available, who can take charge and make decisions on behalf of the entity during an emergency and liaise with emergency services.
- Emergency response personnel are available, who are familiar with the work area ensuring the prompt evacuation of the workplace in the event of a fire;
- Adequate firefighting and first aid equipment is available for the type of work activities and the equipment present in the workplace;
- Employees are trained in emergency response, including information of first aid arrangements and where first-aiders, first aid equipment and facilities are located;
- Employees are appointed as first-aiders and available at each location and during each working shift when work is being conducted.

Further information on first aid can be found in OSHJ-CoP-16: First Aid.

Further information on developing an emergency plan can be found in OSHJ-CoP-18: Emergency Preparedness and Response.

8 References

OSHJ-CoP-01: Risk Management and Control

OSHJ-CoP-11: Management of Hazardous Substances

OSHJ-CoP-14: Management of OSH Illness and Disease

OSHJ-CoP-16: First Aid

OSHJ-CoP-18: Emergency Preparedness and Response

OSHJ-CoP-19: Waste Management

OSHJ-GL-07: Personal Protective Equipment

OSHJ-GL-26: Training and Competence



9 Document Amendment Record

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1	15 SEP 2021	New Document	N/A