

## Technical guide

Spray painting is susceptible to severe fires and explosions that can destroy potentially key equipment and cause major disruption to the business. A number of preventative and protective measures are discussed in this technical guide with the aim of mitigating the main hazards of spray painting.

### Background

Spray painting is a painting technique where a device sprays a coating that is typically a paint, varnish, laqueur etc. through the air onto a surface. Spray booths are typically found in the automotive, commercial, industrial and aerospace industries amongst others. The spray can be applied manually or by a robot. Most operations involve the use of flammable solvent based coatings which presents the fire hazard due to spillage and from overspray deposits on the internal surfaces of spray booths. The latter is particularly prevalent in the non-visible areas such as in the air extraction ducts creating a major fire exposure. In addition, overspray has a tendency to spontaneously combust if allowed to accumulate. Spray booths also in some cases require the addition of heat for curing or drying thereby increasing the fire risk further.



**This guide is designed to provide an overview of the spray painting and controlling the fire hazards. For more information please consult QBE Risk Solutions.**



## Management & Housekeeping

The effectiveness of physical controls becomes severely diminished without suitable management systems in place and in particular relating to housekeeping. The following should be implemented:

- The inside and outside of spray booths should be kept clear of all material and equipment not essential for the actual spraying operation.
- The interior of the spray booth, including the ventilation system components and sprinkler heads, must be cleaned of paint residue regularly.
- The use of non-sparking tools for cleaning is a must (such as plastic, brass or bronze) and the use of "strippable coatings" will simplify the process. Low flash point solvents such as petrol/ kerosene should not be used for cleaning.
- Scrapings, sweepings and oily waste should be disposed of in metal containers with lids and removed from the building daily. Filters should be changed regularly as they become clogged.
- The spray booths should be subjected to a planned preventative maintenance programme as recommended by the equipment supplier.
- Hot work should be avoided within the area or a permit system strictly followed if unavoidable.
- Suitable employee training should be given to all staff working in the area.

## Location

Ideally the spray operation must not expose anything surrounding it. If this is the case then it should be within at least a 30 minute fire resistance cut-off spray room and preferably located at an outside wall. Openings to the area should be self-closing fire doors and internal surfaces should be smooth to aid cleaning. In some instances non-combustible draft curtains may be an acceptable alternative for small-scale operations.

## Ventilation

Ventilation is vitally important to ensure the vapour concentration remains below the lower explosion limits during normal operation and to remove overspray.

- The system may be wet (waterfall type) or dry (filter bank) which are usually cheaper to install but require frequent changes of filters.
- Flow rates should be maintained above a minimum that is typically 30m/min.
- Dry filters accumulate heavy overspray residues that clog the exhaust system and restrict the air velocity. Strict maintenance procedures should be established to ensure replacement of dirty and clogged filters.
- In addition, dry filter banks should be equipped with a filter gauge and an electric switch arranged to sound an alarm and shut off the air supply to the spray gun in the event that the air velocity is inadequate.
- Extraction fans should also be interlocked with the spray equipment and should be run before and after spray operations for a set period.
- Fans and ducts should be assessable for cleaning and in particular at bends.
- Cleaning frequency should be based on assessment of the build-up of overspray deposits but should not exceed 0.8mm other than dry film form.

## Heating

If required all heating should be indirect using for example hot water or warm ducted air. All heating equipment should be separate from the process area with the exception of fixed electric heaters, which must be certified for the use. No heating equipment should exceed a surface temperature of 120 deg C.

## Electrical Equipment

Present a potentially significant ignition source and so should be certified explosion protected and selected in accordance with BS 60079-10 (ref 3) and its associated zones (Zone 0, 1, 2 etc.). The operation's DSEAR assessment should reference this with a clear and concise zoning diagram and should refer to all fixed and portable equipment. In addition flexible leads must be provided to bond any container whereby static electricity can be generated. Note that mobile phones should also be prohibited from such areas.

## Paint storage, mixing and distribution

- Bulk storage of paints should be kept in a dedicated store that is either detached or cut-off from other areas by a minimum of 2 hours fire resistance.
- Quantities for the working area should be kept to no more than that required for a single shift.
- Approved safety containers should be used for dispensing, transport and handling of flammable solvents.
- Mixing and dispensing operations should be within dedicated areas (not the store room) enclosed by non-combustible partitioning.
- Ventilation and electrical equipment should be as specified earlier within this document and associated flammable liquid handling and storage data sheets.
- Transfer of finishing material from storage or mixing area to spray area should be via steel pipe. An automatic means of shutting off the transfer in the event of a fire in the spray area should be provided.

## Fire protection

Ideally automatic sprinkler protection should be provided for the spray area, exhaust ducts (including areas behind filters), mixing and dispensing areas and product drying areas. Sprinkler heads should be covered with cellophane or paper bags if subjected to overspray and changed frequently. If automatic sprinklers are used in a non-sprinklered building, the water may be furnished from the domestic supply.

## Electrostatic Spray painting

A variant of the process is the use of electrostatic paint systems, which is used to minimise paint wastage. It is key to prevent ignition by the discharge of static electricity. All equipment and personnel within 3 metres of the electrodes need to be connected to a common earth. Hangars on conveyor systems will need to be cleaned regularly to provide effective earthing of the work piece. Special care is needed when cleaning guns or nozzles. The power needs to be turned off and all cans of solvent need to be connected to earth.

## Checklist

<input checked="" type="checkbox"/>	Excellent housekeeping throughout
<input checked="" type="checkbox"/>	Strict control of ignition sources including electrical equipment, smoking and hot work
<input checked="" type="checkbox"/>	Regular cleaning of air filtration ductwork
<input checked="" type="checkbox"/>	Regular cleaning and/or replacement of filters
<input checked="" type="checkbox"/>	Piping of paints and solvents are interlocked to the fire protection or heat detection systems with automatic cut-off
<input checked="" type="checkbox"/>	Emergency response plan includes spillages in conjunction with pre-fire planning with fire brigade
<input checked="" type="checkbox"/>	A suitable and sufficient Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR) assessment performed if using flammable coatings
<input checked="" type="checkbox"/>	Employee training provided of normal and emergency operations - refreshed annually

### Guidance and other useful information:

- FM Global Property Loss Prevention Data Sheet: LPDS 7-27 Spray Application of Flammable and Combustible Materials
- FPA RC 32: Recommendations for fire safety in paint spraying processes (excluding automotive refinishing)
- Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR).
- NFPA 33: Standard for spray application using flammable or combustible materials
- BS 60079-10:2003: Electrical apparatus for explosive gas atmospheres. Classification of hazardous areas.

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