

# Workplace Health and Safety Bulletin



## Spray Application of Paint and Coatings

In industry, the most popular method of applying paint and coatings is to spray it on using an airless sprayer, compressed air, or an electrostatic applicator. Primers and lacquers are also commonly applied this way. When these products are sprayed on, mists and vapours are generated which can increase your exposure to the paints or coatings. This guide outlines some of the hazards associated with spray application and provides information on how to protect the workers.

Paint is a general term for a family of products used to protect and add colour to an object or surface by covering it with pigmented coating. There are several components to paint which can include binders, pigments, fillers, diluents, and additives. The most important component is the binder, which is generally made up of natural or synthetic resins such as acrylics, polyurethanes, epoxy or polyesters.

Primer is a preparatory coating put on materials before painting to ensure better adhesion of paint to the surface. It increases paint durability and provides additional protection for the material being painted. Epoxy coatings are widely used as primer to improve the adhesion of paints, particularly where corrosion resistance is important.

Lacquer is a clear or coloured coating that consists of a resin dissolved in a fast drying solvent. The solvent can be a mixture of naphtha, xylene, toluene and ketones, including acetone. Lacquer dries by solvent evaporation which in turn produces a hard, durable finish.

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This guide outlines some of the hazards associated with spray painting and provides information on how to protect yourself.

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Employment and Immigration

## Application

Paint and coatings can be applied as a solid, aerosol, or as a liquid.

As a solid, paint can be sprayed on as a very fine powder. It is then baked at high temperatures, where it melts and adheres to a surface. This process is known as powder-coating.

As an aerosol, paint is suspended in solid or liquid form in a gas that is sprayed on an object.

As a liquid, paint can be applied by direct application using brushes and paint rollers.

The method in which these products are applied can affect the workers exposure to them.

## Where are spray application operations commonly found?

- Auto-body shops
- Sign painting shops
- Furniture, door and appliance manufacturing facilities
- Metal fabrication shops where oilfield equipment, heavy machinery and transportation equipment is manufactured and repaired
- Sandblasting/coating facilities

## Health effects

Overexposure to a substance means that too much has been breathed in, swallowed or absorbed through the skin. The main way that one can be exposed to primer, paint or lacquer when spraying them is by inhaling them and through skin absorption.

The possible health effects of overexposure to these products can vary depending on the chemicals they contain. Workers should ask their employers for the *Materials Safety Data Sheet* (MSDS) for the chemical products that are used at the work site. The MSDS will describe the hazardous ingredients in the product and the possible hazards associated with using it.

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Most of the health effects from paints and lacquers is from the solvents they contain. Some of the common solvents are toluene, xylene, ketones, esters and alcohols. The main health effects from exposure to these solvents can include:

- eye and skin irritation;
- respiratory tract irritation;
- dermatitis;
- dizziness/light headedness;
- drowsiness;
- disorientation; and
- nausea/vomiting;

Repeated exposure to these solvents can cause long term health effects such as nerve, kidney or liver damage.

Paints and lacquers also contain pigments. These pigments can contain lead, chromium, nickel, cadmium and zinc. Exposure to high concentrations of these metals can cause heavy metal poisoning. Symptoms of heavy metal poisoning vary considerably depending on the metal that you have been exposed to.

Paint and primer may also contain epoxy resins which may contain epichlorohydrin. Epichlorohydrin is an upper respiratory tract irritant that can be readily absorbed through the skin and has the potential to cause reproductive effects.

Some primers, polyurethane paints and lacquers also contain isocyanates. Isocyanates are a group of very reactive chemical substances. They are highly irritating to the skin, eyes, nose, throat and lungs and workers exposed to them may become sensitized. Inhalation of isocyanate containing products can cause asthma-like wheezing with tightness in the chest and skin contact can cause a severe inflammatory reaction, producing pain, redness and swelling.

For more information



[http://employment.alberta.ca/documents/WHS/WHS-PUB\\_ch005.pdf](http://employment.alberta.ca/documents/WHS/WHS-PUB_ch005.pdf)


Isocyanates at the Work Site - CH005

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Many ingredients found in primers, paints and lacquers have exposure standards for workers called Occupational Exposure Limits (OELs). An OEL is the legal airborne concentration of a substance that most workers can be exposed to on a day to day basis without suffering adverse health effects. A list of the OELs can be found in Schedule 1, Table 2 of the Occupational Health and Safety (OHS) Code.

 [http://employment.alberta.ca/documents/WHS/WHS-LEG\\_ohsc\\_2009.pdf](http://employment.alberta.ca/documents/WHS/WHS-LEG_ohsc_2009.pdf)  
Occupational Health and Safety Code (2009)

## Fire and explosion hazards

One of the major safety concerns associated with spray application is the combustible and flammable vapours, mists, and residues that may be created.

It is important to ensure that all potential sources of ignition have been removed prior to spraying flammable and combustible products. Potential sources of ignition include:

- open flames (work space heating units)
- cutting and welding torches
- gas fired heaters
- electrical outlets and lighting
- non-explosion proof equipment such as radios, lamps, heaters and motors
- static electricity
- smoking


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Whenever possible, painting or priming operations should be done in a spray booth or room.

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The correct type of fire extinguishers must be readily available at the work site.

For more information

 [http://employment.alberta.ca/documents/WHS/WHS-PUB\\_fex002.pdf](http://employment.alberta.ca/documents/WHS/WHS-PUB_fex002.pdf)  
Handling and Storage of Flammable Materials at the Work Site

## Preventive measures

Following a few sensible rules can help to reduce your exposure to the chemicals involved with spray application and minimize the fire and explosion hazards. Many of these rules are found in specific sections of the Occupational Health and Safety Code.

## Engineering controls

### Use of less hazardous substitutes

Where possible, substitute the type of primer, paint or lacquer that you are spraying with a product that is non-flammable and less toxic. For example, water-based coating materials are available which are considerably less toxic and more environmentally friendly than solvent based lacquers.

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### Ventilation

When a spray booth or spray room is used to apply a flammable substance, the employer must ensure that:

- the spray booth or spray room is provided with ventilation in accordance with Part 26 of the OHS Code;
- the ventilation complies with the requirements in the Alberta Fire Code and Alberta Building Code;
- the ventilation in the spray booth or spray room will adequately remove flammable vapours, mists or powders to a safe location (the system should not vent back into the workplace);
- the ventilation system is interlocked with the spraying equipment such that the spraying equipment cannot be used when the ventilation system is not in operation;
- a nozzle guard is provided and used with the airless spray machinery;
- the ventilation system is routinely inspected, maintained and working properly;
- workers are adequately trained on the proper operation and maintenance of the system.

Manufactured spray booths come in a variety of airflow configurations which include: end to end or cross-flow, semi-downdraft and downdraft.

## Isolation

Where spray application of a flammable substance is carried out other than in a spray booth, an employer must ensure that:

- the application is carried out in accordance with the requirements in the Alberta Fire Code.
- the application is carried out at least 6 meters from anything that might obstruct ventilation.
- the application is effectively isolated from all machinery and equipment that is or may become a source of ignition and that is within 2 meters measured vertically above and 6 meters measured in other directions from the place at which spray painting is being applied.
- If it is not practical to carry out the application 6 meters away from anything that might obstruct ventilation, the employer must ensure that the work area where the application is carried out is adequately ventilated to remove flammable vapours, mists, or powders to a safe location.

For more information

Contact the Safety Services Branch of Alberta Municipal Affairs at 1-866-421-6929 or by email at [safety.services@gov.ab.ca](mailto:safety.services@gov.ab.ca)

## Administrative controls

### Education and training


Employers are required to provide workers with *Workplace Hazardous Materials Information System* (WHMIS) training when controlled products are used the work site. Most of the primer, paint and lacquers that are typically used are controlled products. A controlled product is required to have a Material Safety Data Sheet (MSDS) which describes the hazardous ingredients in the product, the possible hazards associated with using the product and the necessary precautions to take.

For more information



[http://employment.alberta.ca/documents/WHMIS/WHMIS-PUB\\_ch008.pdf](http://employment.alberta.ca/documents/WHMIS/WHMIS-PUB_ch008.pdf)

WHMIS-Information for Employers – CH008

 [http://employment.alberta.ca/documents/WHS/WHS-PUB\\_ch007.pdf](http://employment.alberta.ca/documents/WHS/WHS-PUB_ch007.pdf)  
WHMIS-Information for Workers – CH007

## Safe work procedures

Safe work practices must be implemented at the work site. Such practices should include:

- Posting signs indicating “no sources of ignition” in the area where spraying operations are taking place;
- Establishing a change out schedule for the filters used in a spray booth or spray room;
- Regularly cleaning the interior surfaces of a spray booth or spray room with non-sparking scrapers to remove excess paint deposits;
- Conducting routine inspections on the spray booth or spray room to ensure that equipment is maintained and running effectively;
- Ensuring that all spraying equipment is electrically grounded;
- Following the proper storage requirements for the chemical products used.

## Personal protective equipment

Appropriate personal protective equipment must also be used by workers who apply paint and other coating materials if other controls, such as ventilation, are not enough to reduce exposure.

### Respiratory protective equipment

Respiratory protective equipment is used to remove contaminants from the air we breathe. It is very important to use the correct type of respirator for the chemicals being used and the task conducted. There are two types of respirators commonly used in spray painting; the air-purifying and the atmosphere-supplying respirator.

The air-purifying respirator may only be used during exposure to specific chemicals, or groups of chemicals, described on the respirator cartridge. These cartridges are only good for a limited time and must be replaced with new ones when they have been used for their specific lifetime. Odour is not usually a good measure for whether a contaminant is present. People have different abilities to smell chemicals and some chemicals have higher odour thresholds than others. However, if you can smell the odour of the chemical/paint through the cartridge, it must be changed.

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An atmosphere-supplying respirator supplies breathing air to the worker from a high pressure compressor, a low pressure ambient air pump, or by compressed air cylinders. This type of respirator should be used in paint spraying operations that use a two-part primer or paint system which contain isocyanate-based hardeners. Supplied air respirators should also be worn when painting in a confined space (e.g. inside a tank).

The OHS Code requires employers to ensure that:

- the equipment used to supply breathing air to workers has been designed and intended for that use and is being operated in accordance with the manufacture's specifications;
- the air used in an air line respirator or self-contained breathing apparatus is of a quality that meets the requirements of Table 1 of CSA Standard Z180.1-00, *Compressed Breathing Air and Systems*, and does not contain a substance in a concentration more than 10 percent of its' OEL.

For more information



[http://employment.alberta.ca/documents/WHS/WHS-PUB\\_ppe001.pdf](http://employment.alberta.ca/documents/WHS/WHS-PUB_ppe001.pdf)

Respiratory Protective Equipment: An Employer's Guide – PPE001



[http://employment.alberta.ca/documents/WHS/WHS-PUB\\_ppe004.pdf](http://employment.alberta.ca/documents/WHS/WHS-PUB_ppe004.pdf)

Guideline for the Development of a Respiratory Protective Equipment Code of Practice – PPE004

## Eye protection

Eye goggles or full face respiratory protective equipment should be worn while spraying primer, paint or lacquer to protect the eyes from these products.

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## Protective clothing

Some of the products that are used can irritate or cause damage to the skin. Some of these products can be also absorbed through the skin. Your hands can be a significant source of dermal absorption while carrying and mixing paints and coating materials. You can protect your skin by:

- Wearing coveralls;
- Wearing the appropriate gloves designed to prevent the chemicals from coming into contact with your skin;
- Cleaning/changing your gloves and washing your coveralls on a regular basis to prevent chemicals from accumulating;
- Cleaning your hands and exposed skin.

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Protect your skin!


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## Contact us:

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### Province-Wide Contact Centre

 Edmonton & surrounding  
area:  
780-415-8690

 Throughout Alberta:  
1-866-415-8690



Deaf or hearing impaired  
▪ In Edmonton: **780-427-9999**  
or  
▪ **1-800-232-7215**  
throughout Alberta

### Web Site



[www.worksafely.org](http://www.worksafely.org)

## Getting copies of OHS Act, Regulation & Code:

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### Queen's Printer



[www.qp.gov.ab.ca](http://www.qp.gov.ab.ca)



Edmonton 780-427-4952

### Workplace Health and Safety



<http://employment.alberta.ca/whs-ohs>

Call any Government of Alberta office toll-free  
Dial 310-0000, then the area code and telephone number you want to reach

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