

Paint Safety Primer



Actsafe would like to thank Harpreet Gill for developing the information on which this publication is based.

Feedback Request

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Feel free to contact us at 604.733.4682 or by email at info@actsafe.ca.

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Introduction

Painters in the entertainment industry are potentially exposed to chemical hazards from paint products.

Painting in the arts industry is dynamic; painters often work with varnishes, paint spraying and other similar jobs that put them at risk equal to or greater than painters in other professions. Studies have shown that painters have a 30% or greater risk of lung cancer. Additionally, there are increased risks for cancer of the bladder, stomach and esophagus. The health risks can be reduced by limiting and/or eliminating exposures.

The information contained in this booklet aims to arm painters with the knowledge and information to protect themselves and stay healthy for years to come.

Paint Regulations

Paint materials are recognized as a “controlled product” under Workplace Hazardous Material Information System (WHMIS), which means they are hazardous chemicals that may cause harm to workers in the workplace. Information about these potentially harmful chemicals is usually given through Material Data Safety Sheets (MSDS), labels and education/training programs.

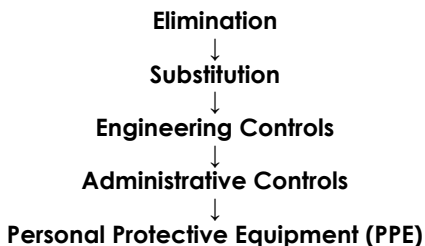
WorkSafeBC has set Occupational Exposure Limits (OELs) for hazardous materials. The exposure limits corresponds to airborne concentrations of the chemical substances that should not be exceeded under any circumstances for an 8-hour workday, 8-hour TWA (Time Weighted Average), and a 40-hour work week. For longer workdays or workweeks, the exposures need to be reduced accordingly.

WorkSafeBC exposure limits closely follow TLVs (Threshold Limit Values) of ACGIH (American Conference of Government Industrial Hygienist). The exposure limits or threshold values are agreed upon by health professionals after intensive & extensive research for health effects of chemical substance.

Workers are considered safe and will not suffer adverse effects if they are repeatedly exposed to chemicals at/below the advised values (OELs or TLVs) for a working lifetime of 8 hours a day and 40 hours a week. The exposure limits are regularly updated, usually brought down, as new evidence appears for potential harmful effects of

chemical substances at even lower concentrations. Most arts industry jobs tend to involve longer hours, ensure that you are following the appropriate time weighted averages for your work day.

If chemical concentration levels at a workplace are near the exposure limits, action must be taken and should follow the “hierarchy of control”:



Engineering controls provide a built-in protection that is inherent in the design of place or process. Personal Protective Equipment (PPE) should be used as a last resort only because it does not reduce or eliminate the hazard. PPE just stands as a barrier between worker and hazard and exposure can result if the barrier fails for any reason.

The foremost effort should be spent trying to completely eliminate the hazardous chemical or substituting it with a safer one. Administrative efforts, such as worker rotation, are also effective in reducing individual exposures.

Occupational Health Effects

Acute effects are usually a reaction (sneezing, irritation) of the human body after a worker is exposed to hazardous material. It may occur immediately or in about a day of exposure. Symptoms of acute effects are reversed once the causal agent is removed, but some acute effects are serious and may prove fatal for sensitized workers.

Chronic effects are a result of prolonged or repeated exposure of workers to harmful substances. Chronic effects show up months or years after the start of exposure, so workers who might appear safe at present may be actually accumulating exposures that can result in a chronic disease.

Workers who smoke have an increased risk of lung disease. An existing health condition (eg. Asthma) may be aggravated even at contaminant exposures that take place much below the specified exposure limits.

Paint Constituents

Solvents

These are liquids that dissolve other substances. Solvents may be present in paint as a constituent or used in thinners, varnishes, adhesives, or glues. Solvents produce vapours that can be inhaled by the painters and anyone else working in the paint shop without sufficient respiratory protection.

Solvents are Volatile Organic Compounds (VOCs) and evaporate more quickly in spray painting than brush applied paints. Spray painting produces aerosols that contain Toluene and Xylene. Common solvents used in oil paints include mineral turpentine oil and white spirit.

Hazards from solvents:

Ingestion - Even when gloves have been worn, hands need to be properly washed after working with paint products that contain solvents, so that they are not ingested with food by accident. Solvents can prove extremely poisonous if taken orally.

Skin contact – Results not only in skin irritation but organic solvents are known to be absorbed through the skin and into the blood stream. Skin exposures are generally high when painters work without sufficient protective clothing and spray booths have less than required ventilation.

Inhalation - Respiratory exposure of solvents occurs when paint spray booths have less than required ventilation and painters work without respiratory protection. It may produce short lived symptoms such as nose or throat irritation and inflammation. Studies have shown solvents to produce long term/chronic effects of decreased pulmonary function, neurologic disease, and damage to the liver and kidneys. Painters who've had long exposure to solvents can have mood and behavioural changes as a result.

Remember!

1. Always ensure proper ventilation in the workplace.
2. Avoid breathing vapours. If you start to feel dizzy, get out of the work environment and into fresh air.
3. Avoid skin contact with solvents.
4. Solvents are inflammable. Prevent static electricity discharges in the paint area.
5. Dispose of waste solvents and rags in the appropriate coloured canisters available in your workplace. Do not pour used paints/solvents down the drain or put into the garbage.
6. Spray painting should be done only in the spray paint booth.
7. Personal protective equipment should be used at all times during spray painting.

Caution : Methylene Chloride in Adhesives and Paint Stripping

Methylene chloride or Dichloromethane is a designated hazardous substance. It is a highly volatile solvent used in paint stripping and adhesives.

According to its MSDS, Sta'-Put SPH aerosol adhesives contain 45-70% Methylene chloride. Sta'-Put is commonly used in construction shops of BC Film studios.

Exposure: The most common exposure to Methylene chloride is from breathing contaminated air. It can also enter the body through skin contact or by accidental swallowing.

Health Effects :

- Methylene Chloride may cause severe skin and eye irritation
- Workers inhaling smaller amounts of Methylene chloride may become less attentive and less accurate in tasks requiring hand-eye coordination.
- Inhaling high levels of Methylene chloride vapour causes dizziness, headache, drowsiness, tingling or numbness of fingers and toes, loss of consciousness and death.
- The human body converts inhaled methylene chloride to carbon monoxide, which lowers the blood's ability to carry oxygen.

Carcinogenicity: Methylene Chloride causes lung and liver cancer in laboratory animals. It is suspected to also cause cancer in humans.

Precautions :

- Reduce exposure to Methylene Chloride vapours by using a substitute adhesive that does not contain this chemical substance.
- Use Methylene Chloride products as per the MSDS instructions and only in spaces with adequate ventilation.
- Wear personal protective equipment, impervious gloves and eye protection at all times while working with Methylene chloride.
- Use properly fitted respiratory protection. Call Actsafe at 604.733.4682 to arrange free Respirator Fit Testing.

Pigments

Paints contain a wide range of pigments that contain heavy metals (cadmium chromium, manganese) to produce vivid colours. In recent years, paints with metallic pigments that contain finely divided aluminum or zinc powder have become widely produced. Exposure to high concentrations of these metals can potentially cause heavy metal poisoning.

Common Inorganic Pigments	Paint Colour(s)
Carbon Black	Black
Titanium Dioxide	White
Iron Oxides	Yellow, red, brown, black
Zinc Chromates	Yellow
Azurite (containing Aluminum, Silica)	Blue
Chromium Oxides	Green, blue
Cadmium Sulphides	Greenish yellow to red to bordeaux
Lithopone (containing Zinc and Barium)	White

Hazards from pigments:

Ingestion: Ingestion of small quantities of heavy metals over time can lead to poisoning and other chronic effects.

Skin contact: Solvents in paint are more likely to cause skin irritation than the pigment itself. Wash hands after handling these materials.

Inhalation: Paint pigments are composed of tiny solid particles less than 1 μm in diameter, a size that enables them to refract light and give beautiful colours; however, these particles can be easily inhaled from air and deposited throughout the respiratory tract, including highly sensitive, deep, alveolar regions of the lungs. The risk of pigment inhalation is high for painters in the film industry because spray paint aerosols contain pigment particles which are not normally airborne.

Carcinogenicity: Some paint pigments contain hexavalent Chromium (6+) which is a lung carcinogen.

Remember!

1. Check the pigments you're using. Know what they contain and what their potential hazards are! Always refer to the MSDS sheet!
2. Do not leave paintbrushes in solvents.
3. Keep solvent and paint containers closed.
4. After working with paint, wash your hands before eating, smoking or touching your face.

Binders (Isocyanates)

Isocyanates are used for making polyurethanes that are added in enamel paints as binders for keeping pigments on the surface. Most commonly used Isocyanates are toluene diisocyanate (TDI) and Methylene Bisphenyl Isocyanate (MDI). Binders in paint contain some unreacted Isocyanate that evaporates into air during spraying and poses an inhalation risk. Varnishes also contain Isocyanides.

Hazards from Isocyanates:

Skin contact: Isocyanates may cause rashes, blistering or reddening of the skin. Airborne Isocyanate molecules can induce irritation and tearing in eyes and can result in eye tissue damage.

Inhalation: At moderate levels, Isocyanates can cause respiratory tract irritation. Symptoms include coughing, sore throat, chest pains and shortness of breath.

High concentration results in abnormal contraction of the bronchial tubes responsible for breathing (bronchospasm). Chronic bronchitis or inflammation of bronchial tubes is the result of long exposures, which can result in the deterioration of the efficiency of lungs over a period of time.

Another serious effect of Isocyanates is lung sensitization. Once sensitized, smaller exposures can produce severe allergic reactions, wheezing, gasping and shortness of breath. These symptoms may appear right after exposure, or can take

hours to appear. Unfortunately, the sensitization of body and associated symptoms are permanent.

Carcinogenicity: According to International Agency for Research on Cancer (IARC), Toluene Diisocyanate (TDI) and Methylene Bisphenyl Isocyanate (MDI) are *possibly carcinogenic to humans*. Exposure to Isocyanates may increase the risk of cancer.

Remember!

1. Turn ventilation systems on before working.
2. Do not dip hands in chemical baths.
3. Clean up small spills with a wet sponge.
4. Perform spray painting work under an effective exhaust ventilation system inside the paint spray booth to contain Isocyanide vapours and protect other workers from exposure.
5. Leave contaminated clothing at the work place to protect family members.
6. Wash hands before eating, smoking or touching your face.
7. Use recommended personal protective equipment such as coveralls, gloves, respirators.

Additionally:

- Paints also contain a fungicide additive, Tributyltin, for protection against mold. It is a skin and eye irritant.
- Some latex paints emit formaldehyde when drying.
- Paints may contain epoxy resins that contain a chemical called Epichlorohydrin; it is an upper respiratory irritant, can absorb through the skin and has the potential to cause reproductive defects.

Caution: Fire and explosion hazards in paint spray areas

Paint spray produces combustible and flammable vapours, mists and residues that can catch fire very easily. All potential sources of ignition need to be removed from the paint spray area prior to spraying flammable and combustible products. The correct type of fire extinguishers should be readily available at the work-site.

Potential sources of ignition include :

- Cutting and welding torches
- Gas fired heaters
- Electrical outlets and lighting
- Static electricity
- Smoking
- Open flames

Preventive measures:

- Substitute the type of primer, paint or lacquer with a product that is non-inflammable and less toxic. Water based coating materials are less toxic and more eco-friendly than solvent based paints.
- Adequate ventilation in the spray booth is required to remove flammable vapours, mists or powders to a safe location.
- Ventilation and spraying systems should be interlocked so that spraying equipment can not be used when ventilation is not in operation.
- Airless spray systems need to be equipped with nozzle guards.

- Ventilation systems should be routinely inspected, maintained and in proper working order.
- Post signs indicating “No source of ignition permitted in this area” in the area where spraying operations are taking place.
- Regularly clean the interior surfaces of a spray booth or spray room with non-sparking scrapers to remove excess paint deposits
- All spraying equipment needs to be electrically grounded.
- Safe storage of the chemical used in spraying.
- Routinely inspect spray booth or room to ensure equipment is maintained and running efficiently.
- Sprinklers should not be left uncovered as they can get clogged with overspray and fail to work in case of fire. Cover sprinklers with cellophane or paper bags which will burn off in case of fire, activating sprinklers.

Training

Painters and all those working in the paint department should have the appropriate education and training so that they understand and follow WHMIS and WorkSafeBC regulations.

Actsafes's Safety Passport System keeps an online account of all the safety training completed by workers and is accessible to the employers, thus employers can themselves check for the proper training of a worker before assigning a specific task.

Workers must understand the WHMIS classification for chemical substances and know the type of hazards associated with its use and possible exposure that may result. They should be able to read container labels and MSDS sheets for the appropriate safety information.

Workplace education and training includes:

- Understanding paint products used in paint departments.
- Rights and responsibilities of workers, employers and supervisors.
- Required information on workplace labels.
- Emergency procedures for controlled products.
- Safe operation of spray equipment.
- Safe storage of controlled products.
- Understanding of the required ventilation.
- When and how to properly use PPE.

Material Safety Data Sheets (MSDS)

Material Safety Data Sheets (MSDS) contain information on hazardous ingredients of products and possible hazards that may be associated with using them.

Keep an inventory of the types of paint or paint products used in your department. Ensure that you have MSDS for all controlled products. Products without a MSDS must be taken out of use.

MSDS sheets should be kept somewhere they can be accessed by everyone. Keep only those sheets for products used in the facility. Old sheets should be replaced when updated versions are available.

A typical MSDS sheet should include:

- product and company identification
- hazard identification
- composition/information on ingredients
- first aid measures
- fire-fighting measures
- accident release measures
- handling and storage
- exposures control/personal protection
- physical and chemical properties
- stability and reactivity
- toxicological information
- ecological information
- disposal considerations
- transport information
- regulatory information
- any other pertinent information

Material Safety Data Sheets (MSDS) should be:

- requested from the supplier if not provided with the product
- Canadian
- current, not more than three years old
- easily accessible to workers
- available at all work locations

Online MSDS resources

Actsafes website (www.actsafe.ca) includes links to most of the major manufacturer websites to help you track down any MSDS you may need. If you can't find an MSDS on a manufacturer's website or if the manufacturer is not included in the links, there are also links to databases where you can look for a missing MSDS.

Go to www.actsafe.ca, click "Links", and look for "MSDS Links" and "Manufacturer MSDS Websites".

Product Labels

Two types of labels are used for controlled products: Supplier labels and Workplace labels. Generally, suppliers are responsible for providing supplier labels and employers are responsible for providing workplace labels.

Supplier Labels: These include information such as the name of the product, hazard symbol, precautionary statements and first aid measures. Supplier labels are supposed to be on all containers of controlled products that are sold for use in the workplace.

Workplace Labels: Workplace labels need to be put on the container if:

- the supplier label has been damaged or removed
- the controlled product is produced on-site
- the product is transferred from its original container to an unlabelled container
- when adding controlled products to latex paint (colorants, metallic pigments, solvents or drywall fillers)

Workplace labels can be as simple as writing the information directly on the container using a permanent marker. Workplace labels require three pieces of information:

- Product identification
- Safe handling instructions and any personal protective equipment required
- Reference to the MSDS sheets

Remember!

- Identify and label all paint containers.
- Obtain MSDS for all paint and other hazardous products in the paint shop.
- Inventory all controlled products in the work place.
- Replace product labels as necessary.
- Address leaking chemicals immediately.
- Read paint product label and its MSDS before using.
- Do not spray paint or mix chemicals without appropriate personal protective equipment.
- Avoid using a chemical if it has no label or MSDS.
- Don't trust appearance of a paint or chemical as an indicator of safety.

Substitution

Substitution is a strategy of replacing a hazardous product with one that is less hazardous. In paint departments more hazardous oil based paints can be substituted for less harmful, water based, latex paints.

Similarly other compounds can be substituted for their less harmful variants after comparing their chemical properties and exposure effects. Substitution is the least expensive method in the hierarchy of control. The use of hazardous paint products demands installation of highly expensive engineering controls such as specialized spray painting booths.

How to Substitute

- Conduct an inventory of the toxic products present in your paint shop.
- Refer to the *Toxicity Table* (available at www.actsafe.ca) to get information on hazardous ingredients, exposure routes, acute (immediate) toxic effects and chronic (long-term) effects.
- Look at the far right column for toxicity rating for each product. A lower number means the product is less toxic and therefore safe for use.
- Select the product for your task which has lowest toxicity rating. If you find the product is not suitable for the task, try the product with next lowest toxicity rating.
- Proceed with the substitution.

Further Information

- Agency for Toxic Substances and Disease Registry (ATSDR)
www.atsdr.cdc.gov
- National Institute for Occupational Safety and Health (NIOSH)
www.cdc.gov/niosh/ipcs/nicstart.html
- International Chemical Safety Cards
www.ilo.org/legacy/english/protection/safework/cis/products/icsc/dtasht/index.htm
- Information about carcinogenicity of compounds can be found in the monographs published by International Agency for Research on Cancer (IARC), available at:
www.monographs.iarc.fr/ENG/Classification/index.php

Good Ventilation

Ventilation removes air that is contaminated with paint vapours and substitutes it with the fresh air so that paint aerosols are not inhaled by workers and don't settle on their skin.

Paint spraying is most commonly used with an airless sprayer, compressed air, or an electrostatic applicator. As an aerosol, paint is suspended in solid or liquid form in a gas that is sprayed on the object. Breathing paint aerosols produces both immediate and long-term health problems.

Acute (immediate) effects of paint vapour inhalation are usually due to the solvents (toluene, xylene, ketones, esters, alcohols) present in the air and show as eye and skin irritation, respiratory tract irritation, dizziness, drowsiness, disorientation, and/or nausea. Repeated exposures to these solvents can cause nerve, kidney or liver damage.

Try to use the paints which do not contain these solvents or use methods that produce fewer aerosols (Substitution). Ventilation is an engineering control and should be used when all possible substitutions have been made.

Types of Ventilation:

Paints are applied both on sets and in spray booths. Studios should have specially made paint spray booths that are available for use.

There are three basic types of industrial ventilation:

- Local Exhaust ventilation
- Dilution ventilation
- Natural ventilation

Local Exhaust Ventilation

Involves installing structures like fume hoods that capture contaminants at or near the source, transporting them to a collecting area and then exhausting outdoors (away from any air intakes).

Local exhaust ventilation is the preferred method of control in paint shops/spray booths because of its effectiveness, and because it works at low flow rates and does not dramatically increase heating costs.

Advantages	Disadvantages
<ul style="list-style-type: none">• Effective contaminant removal system from source.• Less expensive than other ventilation options• Fire is restricted to one area, in case it occurs• Other workers are protected from secondary exposures• Needs less cleanup as contaminant is captured at source	<ul style="list-style-type: none">• Initial installation costs are high.• High maintenance: replacing filters and removing paint build-up from overspray in the ducts.• Occupies space in the paint shop.• Due to more emphasis on the local ventilation, an effective fire-suppression system is needed for the booth itself.

Dilution ventilation is the use of exhaust fans or propeller-style blowers to push out the contaminated air and bring in fresh outdoor air. The generation rate of paint aerosols determine the size of fan required for the paint shop.

As general ventilation for the building, it helps prevent the accumulation of flammable or toxic gases inside the structure. Dilution ventilation is area-ventilation

Advantages	Disadvantages
<ul style="list-style-type: none">• Ideal for film sets as it does not require floor space.• Appropriate for huge sets inside large studio spaces where local ventilation is not feasible.• Exists as part of the building and is not demanding on workers for extra care.• Low installation costs.	<ul style="list-style-type: none">• Needs high volumes of fresh air to reduce contaminant concentration to safe levels.• Higher heating costs than local exhaust ventilation because of the greater quantities of fresh air being moved.• Insufficient for highly toxic contaminants (exposure limits ≤ 100 parts per million), body sensitizers and the areas with high contaminant levels.• Low frequency noise produced by fans that may interfere with film shoots.• High contaminant levels at emission points.

Natural ventilation is air circulation through open doors and windows that occurs in the workplace as a result of difference in wind and thermal pressures, inside and outside the studios.

It can exist in addition to other effective ventilation systems in paint shops, but not by itself because it can result in recirculation of the contaminant. Moreover, the rate of natural ventilation varies and is usually not sufficient for venting out airborne toxicants of paint shops.

Paint Spray Booths

In a paint spray booth, fresh air must move from the worker, past the paint gun and painted product towards the exhaust outlet. The air movement in the booth moves vapours out of the booth, thus reducing worker exposure. An exhaust outlet with a fan usually produces the required air-movement.

Paint spray booths must be built to specifications as required by the standards of the Authority Having Jurisdiction.

Remember: Inside the paint spray booth

- Do not store paints, solvents or used rags
- Do not use tools that may generate sparks (grinding or welding tools)
- Do not use electrical devices
- Do not eat, drink or smoke
- Do not work without personal protective equipment

Maintenance.

Spray booth safety maintenance is a continuous process.

1. Clean and remove overspray from the duct work, floor, ceiling and walls.
2. Clean glass lighting covers and replace burnt-out bulbs.
3. Vacuum the interior of the spray booth with an explosion-proof vacuum.
4. Inspect door seals and intake filters.
5. Check the fire-suppression system.
6. Check exhaust filters.

Changing Exhaust Filters

Exhaust filters should be changed regularly to ensure efficient airflow through the ventilation system. It can be done in two ways :

1. Develop a schedule for changing the filters based on the use of spray booth.
2. Use a pressure gauge or manometer to find pressure levels inside the booth.
 - Install a new filter, turn on the fan and note manometer reading for pressure levels.
 - Check manometer reading every time you are working in the booth.
 - If the pressure reading on the manometer increases by 0.25 in. wg (inches of water gauge), it means that it is time to change the filter. Because increased pressure inside booth indicates a fall in exhaust ventilation.

Operations

Three essentials safe procedures for working inside a paint booth are as follows:

1. Avoid Exposure

Avoiding exposure completely is the best line of defense. Use safe or less hazardous paint materials when possible. Determine how hazardous paints are by reviewing Material Safety Data Sheets for ingredients containing potentially harmful materials and substituting for less hazardous substances. For example, MDI and TDI are

both Isocyanates present in paints but MDI is less harmful than TDI because MDI has low vapour pressure and will not vaporize as easily as TDI when applied.

2. Personal Protective Equipment

Where applicable, use appropriate personal protective equipment such air-supplied respirators, coveralls, and gloves. The requirements for the type of personal protective equipment is dependant on each environment and the types of controls already in place.

It is important to use the correct type of respirator for the chemicals being used. Two types of respirators commonly used in paint spraying are air-purifying and atmosphere-supplying respirator.

The air-purifying respirator may only be used during the exposure to specific groups of chemicals as described on the respirator cartridge. These cartridges are only good for a limited time and should be replaced with new ones, when:

- You can smell vapours in the mask.
- They become difficult to breath through.
- They have been used for their designated lifetime.

The atmosphere-purifying respirator supplies breathing air the worker from a high pressure compressor or an air pump. This type of respirator is required in a paint spraying operation that uses a two-part primer or paint system which contain Isocyanate-based paint hardener.

3. Exposure Control Plan (ECP)

An ECP is required if paints containing hazardous materials are being used in the spray booths. A good plan should have the following elements :

- identification, assessment and control of risk
- monitoring of health
- decontamination procedures
- education and training
- proper documentation

Outdoor Paint Spraying

With the exception of automotive products and sensitizers (Isocyanates and polyamines), outdoor spraying of paints is allowed in the Metro Vancouver region. For other areas, check with the Authority Having Jurisdiction or call Actsafe at 604.733.4682 for advice. However, the following requirements apply for outdoor spraying:

- In order to be WorkSafeBC compliant, an air velocity of at least 0.25 m / s or 50 fpm must be constantly maintained across the work area.
- The painters must be protected by additional administrative controls and personal protective equipment.
- Sprayed material can not be deposited, nor can its odour spread beyond the premises on which spraying occurs.
- A High-Volume Low-Pressure (HVLP) or equivalent efficiency spraying system is a preferred and safer method of applying paint.
- Appropriate warning signs and relevant information must be posted in the area.

- Operating procedures for spray guns needs to be displayed, including: maximum inlet pressure, maximum atomizing air pressure, and air cap number to achieve desired transfer efficiency.

Best Practices in Spray Painting

Task: Dry sanding

- Use vacuum sanders.
- Perform sanding tasks at downdraft or cross draft preparatory stations.
- Wear respirators designed to prevent inhalation of dusts.

Task: Solvent wiping

- Wear chemical protection gloves.
- Performing solvent wiping in downdraft or cross draft paint booths.
- Wear respirators that prevent inhalation of organic vapours.
- Use the least toxic solvents possible for wiping.

Task: Mixing paint materials

- Wear gloves, paint suits, and respirators.
- Use nonhazardous cleaning agents to wash hands and arms.
- Ensure adequate ventilation is provided.
- Close all paint material containers immediately after use.

Task: Spraying

- Use high-volume, low-pressure (HVLP) spray guns to spray primers, basecoats, and clear-coats.
- Consult with paint distributors and gun manufacturers to determine the HVLP gun setting that optimizes transfer efficiencies.
- Train painters on proper spraying techniques.

Task: Spraying (Spray Booths)

- Perform as many spraying tasks as possible, and all clear-coat spraying tasks, in ventilated spray booths.
- Ensure the continued effectiveness of spray booths through regular filter changes and maintenance procedures.
- Continue running spray booths after completing jobs and after curing cycles, so that the booths vent all airborne vapours before workers re-enter them.

Task: Spraying (PPE)

- Install and use supplied air respirators in spray booths.
- Wear gloves, paint suits and head socks while spraying.
- Ensure that painters consistently wear the required PPE.
- Implement change-out procedures for air-purifying respirator (APR) cartridges.
- Consult with painters when selecting PPE.

Task: Paint gun cleaning

- Perform gun cleaning tasks in a well ventilated area.
- Wear gloves, paint suits and respirators when cleaning gun.
- Maintain automated gun cleaners and ensure that they're in good working order.

Remember!

1. Use paint rollers instead of sprays for smaller jobs or when there are other people working in the same area. Rolling paints generally lowers exposures for all.
2. Ensure that workers know how to set up and operate the spray equipment safely.
3. Set up the spray equipment to operate at the lowest air pressure possible for paint atomization. This will help increase transfer efficiency and decrease worker exposure to the paint fog.
4. Use advanced High-Volume Low-Pressure sprayers (HVLP) that produce less paint aerosols.
5. Rotate workers so that different painters work on spray guns instead of a single person working on it all time.
6. High-exposure workers should be given extra breaks after spraying jobs based on the duration of exposure and concentration of paint used.
7. Eliminate all sources of ignition (ie exposed electrical wires of paint spraying equipment or smoking).
8. Use latex paint for spraying; they do not pose risk of fire and explosion.

Personal Protective Equipment

Personal Protective Equipment (PPE) is used when other prevention measures are not feasible or practicable and/or when workers require additional protection even though other controls are in place. It is the last line of defense and should only be used when other controls are not possible.

Common PPE used in paint departments are safety goggles, respirators, gloves, earplugs, and coveralls.

PPE should provide effective protection against exposure, be compatible with the wearer and should be maintained in good working order.

Employer Responsibilities

WorkSafeBC specifies that if PPE is required to protect against a chemical exposure, the employer must implement an effective protective equipment program at the workplace that includes:

- education and training on the proper use and limitations of PPE.
- having PPE available to workers and ensuring that they're using it when necessary.
- written procedures for selection, use, inspection, cleaning, maintenance and storage of the protective equipment. This includes documenting the above.
- an annual review of the program.

A workplace evaluation for the existing hazards and required PPE should be carried out prior to implementing a PPE program.

Worker Responsibilities

- Use PPE as instructed.
- Inspect PPE before each use.
- Report any equipment malfunction to supervisor or employer.
- Ensure the equipment is cleaned, maintained and stored as described in the training.
- Consult a physician if there may be any medical issues that prevent you from wearing a respirator (ie. asthma or heart condition).

Workers are responsible for providing their own clothing against natural elements, as well as general purpose gloves, safety footwear and safety headgear.

Remember!

Personal Protective Equipment (PPE) is last in the hierarchy of controls. Before using PPE, all other controls (Substitution, Engineering controls and Administrative controls) should be looked at first to reduce exposure levels.

Table 1: PPE Requirements for painting

Painting method	Product	Respirator	Respirator cartridge
Brush	Latex paints	Not required in well-ventilated areas	N/A
	Oil-based products	Air-purifying half mask	Organic vapour
	Products containing isocyanates†	Air-supplied full face	N/A
Roller	Latex paints	Not required in well-ventilated areas	N/A
	Oil-based products	Air-purifying half mask	Organic vapour
	Products containing isocyanates†	Air-supplied full face	N/A
Spray system	Latex paints	Air-purifying half mask	Organic vapour with P100 particulate filter
	Oil-based products	Air-purifying full or half mask	Organic vapour with P100 particulate filter
	Products containing isocyanates†	Air-supplied full face	N/A

* Note: Table 1 is a basic guideline only; it assumes that painting is being done in a well-ventilated area, a spray booth, or outdoors with appropriate controls in place. It also assumes that workers are using low to moderate quantities of paint. If larger quantities of paint are involved, use more stringent controls to ensure worker safety. In any case, you should always perform a risk assessment before painting and refer to Material Safety Data Sheets (MSDS) for specific information on appropriate PPE for the product being used.

	Gloves	Eye protection	Hearing protection	Protective clothing
	N/A	N/A	Depends on noise sources	Long sleeves, pants, or coveralls
	Nitrile	Safety glasses	Depends on noise sources	Long sleeves, pants, or coveralls
	Nitrile	N/A	Depends on noise sources	Tyvek suit
	N/A	N/A	Depends on noise sources	Long sleeves, pants, or coveralls
	Nitrile	Safety glasses	Depends on noise sources	Long sleeves, pants, or coveralls
	Nitrile	N/A	Depends on noise sources	Tyvek suit
	Nitrile	Safety glasses or goggles	Yes	Tyvek suit
	Nitrile	Goggles (if using a half mask respirator)	Yes	Tyvek suit
	Nitrile	N/A	Yes	Tyvek suit

† Note: Workers should always use full-face air-supplied respirators when working with isocyanates because they have no warning signs and are extremely toxic. Furthermore, respirator cartridges have no effective end-of-life service indicator for cartridge replacement.

Respirators

Painters are required to wear a respirator that provides an effective seal with the face in order to function properly. Workers should be clean-shaven and should not wear anything which intrudes between the face-piece and face, except for specialty eyewear approved by Work-SafeBC to be used with positive full face-piece respirators.

Respirator can be “Supplied-Air Respirator (SAR)” that delivers a steady flow of respirable air from a compressor to the user’s face piece or “Air-Purifying Respirator (APR)” act as a barrier between ambient air and respiratory system; usually, such respirators are fitted with chemical cartridges and/or filters to trap the particulates, gases or vapours.

DO NOT use Air-purifying Respirators when:

- working in an oxygen deficient environment.
- working in an environment where the hazardous material concentration is Immediately Dangerous to Life or Health (IDLH).
- contaminant concentration is 10 times the exposure limit (for half-mask respirators).
- respiratory sensitizers are sprayed (Isocyanates, urethanes and resin containing materials).
- the worker is not fit tested.
- the worker is not clean shaven.
- the worker has a medical condition such as asthma, heart disease or high blood pressure.

Respirator Fit-testing

Respirator fit-testing is required before a respirator is first worn and must be repeated on an annual basis. Employers must maintain a record of fit-test results.

A fit-test confirms that the right sized respirator is being worn and that there is no air leakage, that could potentially expose workers to contaminants in the ambient air. Other PPE that may be worn in conjunction with the respirator should also be worn during the fit-test.

Respirators can't be issued to the worker unless a fit-test demonstrates that the face-piece forms an effective seal with the wearer's face.

Fit-test should be done only by certified health and safety personnel. **Contact Actsafe for free fit-testing at your workplace.**

Respirator Fit-check

A must before each respirator use to confirm an effective seal with the face. Workers should perform a positive and negative pressure check by pushing air in and out from the respirator when wearing it and blocking the filters with their hands.

Key Elements of a Respiratory Protection Program

1. A **written plan** detailing how the program will be administered
2. A **complete assessment** and awareness of respiratory hazards
3. **Procedures and equipment** to control respiratory hazards, including the use of engineered controls and safe work practices
4. Guidelines for **proper selection** of appropriate respiratory equipment
5. An **employee training program** for proper care and use of respiratory equipment
6. **Inspection, maintenance and repair** of respiratory equipment
7. **Medical screening** of employees who have health concerns (eg. asthma, heart condition)

Gloves

Material Data Safety Sheets for paint products should be consulted to determine the appropriate type of gloves for the work to be performed.

- Latex gloves are not recommended because of their permeability to solvents. Latex can also act as an allergy causing agent.
- Nitrile gloves are best for general painting purposes, but should be changed after every use in order to protect against breakthrough.
- Neoprene gloves are non-permeable and best for all solvent and cleaning procedures.

Safety eyewear

Painters should wear properly fitted safety eyewear to protect against paint aerosols produced during spray painting.

Protective clothing

Employers must provide body protection when painters are exposed to chemicals that are skin-irritating and can be absorbed through the skin.

Protective clothing protects not only the skin but also the workers regular clothing. This helps protect them against carrying contaminated clothes home and exposing their families and friends to hazardous materials.

Safety footwear

Employers are required to perform a risk assessment to determine if safety footwear is necessary in a specific workplace.

Steel toed boots are generally recommended for workers who are:

- working on sets or in shops.
- carrying and handling heavy objects.
- walking through areas where others are working with heavy objects.
- working where nails or other sharp objects could penetrate their footwear.

Hearing protection

Painting equipment can be noisy which could result in hearing loss over a period of time.

Painters are also exposed to the noise originating from other tools used in the construction shop or on the set.

Noise also has extra-auditory effects that may contribute to increased blood pressure and hypertension. It is also known to cause fatigue and post-work irritability.

Sound level meters can be used to record the decibel levels of noise that painters are exposed to. The best way to test this is to attach a noise recording dosimeter to a painter for a full shift and then evaluate the noise levels and their average over the course of the shift.

Once the noise levels are known, an appropriate hearing conservation program should be put in place.

WorkSafeBC Allowable Noise Exposure Rates

Exposure time	Noise Level (dBA)
16 hours	82
8 hours	85
4 hours	88
2 hours	91
1 hours	94
30 minutes	97
15 minutes	100

According to WorkSafeBC, a worker should NOT be exposed to noise levels above either of the following limits:

- a) 85 dBA daily noise exposure level
(based on an 8 hour day)
- b) 40 dBC peak sound level

Workers exposed to noise levels of 85 dBA or greater should receive annual hearing testing.

Contact Actsafe at 604.733.4682 or info@actsafe.ca to arrange free hearing testing.

The Canadian Standards Association (CSA) rates hearing protection devices (ear-plugs and ear-muffs) as Class A, B, C or Grade 0, 1, 2, 3, 4, based on the amount of noise reduction provided by the protector. The recommended protection for an eight hour noise exposure is:

dBA	Grade	Class
90	1	C
95	2	B
100	3	A
105	4	A
110	Dual*	

**Dual hearing protection: use a minimum of a Grade 2 + Class B earmuff or Grade 3 + Class A earplug.*

Important: Remember that a hearing conservation program should not just focus on distributing ear-plugs and using ear-muffs in the workplace, but other preferred controls (substitution, engineering, administrative) should be considered. Meanwhile, ear-plugs and muffs can protect workers till a permanent solution is available.

Storing Paint Products

Improper storage of paint materials can create a fire hazard. Solvent exposure rates are also higher if paint materials are left outside the storage cabinets.

First Step: Identify the paint material

WHMIS refers to hazardous materials — which includes many paint products — as controlled products. Controlled products fall into different hazard classes; each hazard class is identified by a hazard symbol that you should be able to find on the product label. Below are the most common hazard classes painters will encounter:



- **Class B: Flammable and Combustible Material**



Division 1



Division 2



Division 3

- **Class D: Poisonous and Infectious Material**

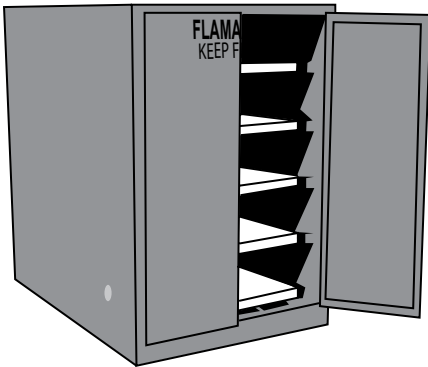


- **Class E: Corrosive Material**

Controlled products in Class B and Class D are further divided as:

	Class B	Class D
Division 1	Flammable gases	Materials causing immediate and serious toxic effects
Division 2	Flammable liquids	Material causing other toxic effects
Division 3	Combustible liquids	Bio-hazardous infection material
Division 4	Flammable solids	n/a
Division 5	Flammable aerosols	n/a
Division 6	Reactive flammable materials	n/a

Second Step: Storing the paint products



Cabinets designed specifically for storing inflammables are the most important component of the storage area. Flammables should only be stored in the cabinet which is properly labeled and has appropriate signage on it.

Storage areas should be:

- Set up in an easily accessible location that is cool, dry and well ventilated.
- Installed with a class-B fire extinguisher and a class-D fire extinguisher, if metallic powders are present.

Worksite label

Paint products must have a worksite label if the manufacturer label has faded, been damaged or covered by paint.

Sample worksite label

Product: _____

Colour/Location: _____

Safe handling information:



Personal protective equipment required:

Respirator

Type: _____

Gloves

Type: _____

Eye protection

Type: _____

Ventilation

Type: _____

Material Safety Data Sheet Available

Remember!

Do NOT store oxidizers with flammables.

Oxidizing agents should not be stored with flammable or combustible products. They should be kept in separate cabinets. Oxidizers can be identified from the product label or the MSDS for the product.

An oxidizer is any product that includes a chemical name with one of the following words in it:

- Chlorate
- Chlorite
- Dichromate
- Hypochlorite
- Nitrite
- Per-chlorate
- Peroxide
- Permanganate

Tips for storing paint products

Order only as much paint as is needed. By ordering too much paint, you increase the demand for storage.

- Do not open paint cans until you need to use them.
- Clearly label the containers having solvents, paint or other paint products.
- Fasten the container lids securely after each use
- Make sure the storage location is easily accessible, yet away from painting activity and lunch rooms.

- Keep containers clear of foot traffic.
- Store paint at temperatures between 3 and 35 degrees celsius.
- Opened paint containers should be sealed in the following manner:
 1. Clean the rim of the can to ensure a proper seal
 2. Pour 3 mm of solvent on top of oil-based paint or 3 mm of water on top of latex paint to seal the surface or
 3. Stretch plastic wrap over the can opening, replace the lid securely and store paint upside down. It will create an airtight seal in the container.

Disposing of Paint Products

Due to their potential for damage to both human health and the environment, paint products should be disposed of safely. Leftover paint products can not be thrown in the garbage or poured down the drain.

Paint waste and products are considered “prohibited waste” and cannot be disposed in Metro Vancouver landfills. Fines up to \$10,000 can be imposed for the violation of the “Sewer Use By-law” that specifies:

“No person shall discharge or allow or cause to be discharged into a sewer or sewage facility any prohibited waste.”

Remember!

The 3 Rs: **Reduce**, **reuse** and **recycle** paint products, wherever possible, to minimize waste.

Disposal plan

First Step

Consult the MSDS for each of the paint products being used. Product specific safe disposal information is given in the sheet. Plan the disposal accordingly. If you require further information, call the manufacturing company at the number listed on the MSDS.

Look for the word Isocyanates in the product description. These paint products require special disposal procedures as explained on the MSDS.

Second Step

Find a suitable recycling facility where you can drop off the products. Waste removal companies can collect the paint products and dispose of them for you safely.

While returning the leftover paint, be sure to keep products in their original containers with labels. Do not combine leftover paints with each other or with oils, solvents or other products.

For a list of paint disposal options, sites, and waste removal companies, visit our website at www.actsafe.ca and search the term “*paint disposal options*”.

Third Step

Transport paint products to the recycling site. For some paint products you need Transportation of Dangerous Goods (TDG) training if moving in larger quantities. The following products do NOT need TDG for transport:

- Latex Paints do not fall under the TDG regulation irrespective of the quantities transported.
- Aerosol containers 75 aerosol containers can be carried to disposal location; however, some locations have a limit of 50 at a time.

- Solvent and solvent-based paints can be carried in weights of 5 L and 60 L, respectively.

Ensure TDG certification of drivers for transporting quantities greater than listed above. Shippers and receivers must fill out complete paper work for drivers.

Fourth and final step

Dispose of paint cans. Paint cans that once contained Isocyanates cannot be reused. Before disposing, they need to be decontaminated by filling them with water and allowing them to stand for a minimum of 48 hours, without being sealed, stoppered, or closed. Then pierce the cans before disposing in the trash.

To recycle latex paint cans, add sawdust to the cans that contain paint residue and crush them before disposing in the trash.

What is Actsafe?

Actsafe is dedicated to the promotion of health and safety in British Columbia's motion picture and performing arts industries. Our role is to provide arts workers and employers with the necessary support to ensure everyone goes home safely at the end of the day.

Actsafe is governed by the industries it represents. We operate through two standing committees that represent the motion picture and performing arts communities. Membership on these committees includes both employer and worker representatives.

Our mandate includes providing subsidized training and free industry-related communication, education, services and advice.

Contact us at:

Actsafe

info@actsafe.ca

www.actsafe.ca

Paint Safety Primer

Painters in the entertainment industry are potentially exposed to chemical hazards from paint products on a daily basis.

Painting in the arts industry is dynamic; painters often work with varnishes, paint spraying and other similar jobs that put them at risk equal to or greater than painters in other professions. Studies have shown that painters have a 30% or greater risk of lung cancer. Additionally, there are increased risks for cancer of the bladder, stomach and esophagus. The health risks can be reduced by limiting and/or eliminating exposures.

The information contained in this booklet aims to arm painters with the knowledge and information to protect themselves and stay healthy for years to come.

