There have been several workplace deaths in Australia and overseas associated with using methylene chloride, also known as dichloromethane, in open tanks for stripping paint from furniture. In these fatalities the bodies were found slumped over the tank indicating that the operators had been overcome by vapours when leaning into or over the tank.

This guidance note describes the measures needed to prevent fatalities and serious injuries from exposure to methylene chloride when it is used during paint stripping operations in an open tank.

Use of methylene chloride in the paint stripping industry

Methylene chloride is a volatile solvent used to strip paint from timber. The process typically involves immersing the item in methylene chloride in an open tank, leaving it to soak for several hours or overnight and then washing it using high pressure water. Manual scrubbing and scraping is often carried out to remove paint after soaking.

Some large and bulky items such as wardrobes cannot be fully immersed in the tank, either because of their size, the size of the tank or the depth of solvent. In these circumstances workers lean over or into the tank to scoop and pour methylene chloride over the items and scrape or scrub them for prolonged periods of time. Business or commercial pressure for a quick turnaround on jobs may also contribute to a shorter period of soaking and therefore more manual scrubbing and scraping of the items while still in the tank.

Workplace deaths

Inhalation of methylene chloride vapour can cause dizziness, impaired coordination and central nervous system depression which can lead to unconsciousness and death.

Investigations conducted by WorkSafe Victoria indicate that methylene chloride vapour levels that are immediately dangerous to life build up within stripping tanks. The work practice of leaning over or into a stripping tank to scrub or manoeuvre items is likely to expose workers to these dangerously high vapour levels. As a result, workers risk being overcome by vapours and falling forward into the tank.

Methylene chloride also has other health effects. The vapour can cause headache and irritation to the respiratory tract and eyes. Splashes to the skin and eyes can be painful, while prolonged skin
exposure can lead to dry skin and dermatitis. It is also assigned as a category 3 carcinogen (i.e. a substance suspected of having cancer producing potential) by the National Occupational Health & Safety Commission (NOHSC).

In the fatality cases the deceased workers were not wearing any respiratory protection and few safety measures were in place.

**Practical steps to prevent a fatality**

The employer has a duty to eliminate or reduce as far as practicable risks to employees using methylene chloride. Risks can be reduced by:

**Using a less hazardous product or different method of stripping paint**

Don't use methylene chloride if you don't have to. Use a less hazardous product or less hazardous technique if possible. For example, using water-based products or a brush-on paste rather than liquid methylene chloride may be practicable in some instances and can reduce the risk from exposure to vapours.

**Preventing employees from working over or leaning into the tank**

If it is not practicable to eliminate or substitute methylene chloride, the *key to preventing a fatality is to eliminate the practice or possibility of leaning over and into the tank*. Where operators lean over a tank, they are likely to fall forward into the tank if overcome by vapours. Employers can prevent this by:

- **Raising the tank height**
  By raising the tank off the floor using legs (shown in Figure 1), employees can work upright without the need to lean over and into the tank. Furthermore, if workers are overcome by vapours, the raised tank should prevent them from falling forward into the tank.

- **Using tanks of different size and shape**
  The design of the tanks should be tailored to suit the items to be handled. Large deep tanks should be used for large items such as wardrobes whereas long narrow tanks can be used for skirting boards (shown in Figure 2). This reduces employee exposure because the surface area of solvent is reduced and there is also less space in the tank for vapours to accumulate. The need to manually scrub the items can also be reduced by fully immersing them and allowing them to soak.

- **Increasing the depth of solvent in tank**
  If the depth of solvent in the tank is increased, the items can be fully immersed and left to soak. The need to manually pour solvent over the items and scrub them is eliminated or reduced. There is also less space in the tank for vapours to accumulate.

- **Soaking the items for longer**
  If items are left to soak for longer periods the exposure of employees to vapours is reduced because the need to manually scrub...
items is reduced or eliminated.

- **Conducting manual tasks outside of the tank**
  Where practicable, manual tasks such as scrubbing and scraping should be done away from the tank. A suitable area may be the wash down area where the item can be pressure sprayed with water. If the paint hasn't been completely removed, the item can be placed back into the tank to soak for longer.

- **Use mechanical lifting devices to manoeuvre items**
  Mechanical lifting devices such as small hoists (often roof mounted) enable the operators to distance themselves from vapours and any splashes that may occur when moving items. The use of such devices also eliminates or reduces the need to lean into the tank to move items.

**Ensuring employees do not work alone**
In addition to implementing practicable control measures to prevent employees from leaning over or into the tank, employers must provide adequate supervision to ensure employees work in a safe manner and use the control measures provided. As far as possible they should not work alone when stripping paint with methylene chloride, particularly if they are likely to lean into the tank.

Working alone was an important contributing factor in all the fatalities that have occurred with use of methylene chloride in tanks. While it is an additional safety measure to always have more than one person on site, using the above control measures first to prevent operators falling into the tank is essential and is far more effective in preventing a fatality.

**Important note on local exhaust ventilation**
Local exhaust ventilation (such as extraction fans or hoods) may be useful in reducing overall exposure in cases where employees do not lean into the tank.

However, where the nature of the work is such that employees might lean into the tank, the use of local exhaust ventilation fitted to the tank rim or over the tank is not considered to be an effective solution.

In this case solvent vapours are likely to be drawn through the operators breathing zone.

**Using an airline respirator**
The levels of methylene chloride vapour present in a large tank have been tested and found to be immediately dangerous to life. Where the nature of the paint stripping requires the worker to lean into the tank, an airline respirator supplying clean air is the most appropriate form of respiratory protection. An airline respirator comprises a face mask and an airline attached to a filtered compressed air supply.

*Note: Half face organic vapour cartridge respirators are generally not suitable for exposure to high levels of methylene chloride vapour as the solvent can readily break through the charcoal filter.*

**Additional measures to minimise exposure to methylene chloride**
In addition to the control measures already mentioned, exposure to methylene chloride can be further minimised by taking the following actions:

- Ensure that there is good general ventilation in the workplace by keeping doors and windows open.
- Provide and use covers for tanks when they are not in use.
- If practicable, add a layer of water, wax or suitable medium such as wooden balls to the surface of the solvent to reduce evaporation and the build up of vapour in the tank.
- Reduce the duration of worker's exposure to methylene chloride by rotating them through various tasks in the workplace.
- Provide information, instruction and training to ensure that personal protective equipment is worn and safe work practices are followed.

**Legal requirements**

The *Occupational Health and Safety (Hazardous Substances) Regulations 1999* place duties on employers who use chemicals such as methylene chloride (see in particular Regulations 302 to 321). These regulations require the employer to:

- Obtain material safety data sheets (MSDS) for the chemicals that employees use and make sure they have access to them.
- Set up a hazardous substances register (i.e. a list of chemicals used in the workplace and a copy of each MSDS).
- Make sure that containers, drums and tanks are labelled.
- Assess the risks of methylene chloride taking into account how it is used and the information on the MSDS and product label.
- Ensure that exposure of employees does not exceed the exposure standard (see Note below).
- Make sure that control measures are being properly used and maintained.
- Provide information, instruction and training.
- Conduct air monitoring if necessary.

(Note: The Exposure Standard for methylene chloride, as specified by NOHSC, is an 8 hour average of 50ppm (parts per million) in air.)

In addition, where any risk assessment is to be undertaken or risk control measures are to be implemented, the employer is to consult with the health and safety representative(s) in the workplace. If there isn't a health and safety representative elected, employers are recommended to consult with employees.

The WorkSafe Victoria Code of Practice for Hazardous Substances provides practical guidance on complying with the regulations.

**Further information**

*Act & Regulations*

- Occupational Health and Safety Act 1985
- Occupational Health and Safety (Hazardous Substances) Regulations 1999


If you only want to view the legislation you can use the Parliament of Victoria web site; go to [www.dms.dpc.vic.gov.au](http://www.dms.dpc.vic.gov.au), click on "Victorian Law Today" and scroll down to the "Search" window.

*WorkSafe Victoria*

- Code of Practice for Hazardous Substances – June 2000
Copies of publications, including codes of practice, can be obtained by contacting WorkSafe Victoria on 03 9641 1555, or your local WorkSafe Victoria office.

Other useful health and safety information is available on WorkSafe Victoria's web site; go to www.workcover.vic.gov.au and click on the WorkSafe Victoria logo.

**Other**


If you can't find guidance material that gives the solutions or advice you're after, try the national database of guidance material on the NOHSC web page; go to www.natindex.nohsc.gov.au.

Suppliers of methylene chloride are a source of information on use, chemical properties and health effects of this substance.

**Note:** This guidance material has been prepared using the best information available to WorkSafe Victoria. Any information about legislative obligations or responsibilities included in this material is only applicable to the circumstances described in the material. You should always check the legislation referred to in this material and make your own judgement about what action you may need to take to ensure you have complied with the law. Accordingly, the Victorian WorkCover Authority extends no warranties as to the suitability of the information for your specific circumstances.

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