

# 2-pack isocyanate paints

The **DOs** and **DON'Ts**

**DO** ensure that all work with 2-pack paints is properly managed and supervised

**DO** prevent or control exposure to isocyanate mists and vapours as far as practicable

**DO** wear an air-fed respirator/visor where mists or vapour may be present, especially when spraying or brush/roller painting on areas over 10 cm<sup>2</sup>

**DO** ensure that the air supplied to the air-fed respirator/visor is clean and the required pressure maintained. Check all filters in the air supply system regularly

**DO** wear clean and disposable overalls, gloves and face/eye protection when mixing paint or brush/roller/spray painting to prevent isocyanates splashing onto your skin

**DO** leave the vehicle/panel in the spray booth/enclosure/bake oven with the doors closed while the paint hardens/cures

**DO** maintain all extraction equipment to ensure that it effectively controls exposure. Change filters regularly. Thoroughly examine and test your equipment at least every 14 months (keep records for at least 5 years)

**DO** ensure booths are not leaking. Monitor the effectiveness of the controls, possibly by air sampling or biological monitoring

**DO** provide health surveillance for employees exposed to isocyanates

**DON'T** mix, brush/roller, spray or harden/cure 2-pack paints unless the risks and precautions to be taken have been identified

**DON'T** allow untrained employees to carry out any work with 2-pack paints. Do ensure that the hazards and precautions are fully understood

**DON'T** mix/brush/roller 2-pack paints except in a well-ventilated booth/enclosure or mixing room with the doors closed

**DON'T** spray 2-pack paints in an open workroom. Work only in a well-ventilated booth/enclosure with the doors closed

**DON'T** lift or remove your respirator/visor while spraying (even to inspect newly painted areas) and, if remaining in the booth, wait for at least 10 minutes or until the vapour has cleared

**DON'T** allow unprotected people inside the spray booth/enclosure/bake oven during or immediately after spraying or hardening/curing

**DON'T** keep respirators/visors, gloves or overalls in the spray booth/enclosure or hardening/curing oven. **DO** store them in a locker/clean area. **DO** check that they are in order before use

**DON'T** clean spray-guns in an open workroom. Do use an enclosed gun-cleaning machine or similar

**DON'T** wait until early asthma symptoms occur. It's too late then!



# working with 2-pack isocyanate paints



## Introduction

2-pack paints, in which isocyanate hardener or activator is added to a pigmented or clear base component, are used extensively in motor vehicle repair (MVR) for repainting/refinishing vehicles.

This guidance is aimed at employers, self-employed people, supervisors and employees involved in spray, brush or roller painting of motor vehicle body panels. It explains how exposure to isocyanates in 2-pack paints could affect workers' health, and outlines some of the precautions that can be taken to protect against the main risks.

## What are the dangers?

Exposure to isocyanates can cause long-term and life-threatening illness.<sup>1</sup> There is a risk if unreacted isocyanate is breathed in, or splashed onto the skin or into the eyes. Vapours, spray mists, and dusts containing isocyanates are highly irritant to the respiratory tract and eyes, and may cause or worsen existing asthma, or dermatitis.

Working with 2-pack paints can lead to (allergic) sensitisation to isocyanates. Once someone is sensitised, further exposure to even very small amounts of isocyanates can start an asthma attack. Attacks can take place immediately or be delayed for up to 12 hours after exposure, so the symptoms may occur away from work. Early signs of sensitisation may be runny/itchy eyes or nose, developing later into a wheeze, chest tightness, breathlessness or coughing.

Isocyanates are present in the hardener in two forms, monomer and prepolymer, as well as in mixed paint, before curing. 'Risk Phrases' on the paint supplier's *Safety data sheet* will identify any health hazards, eg:

- Asthma - by breathing in isocyanate vapour or mist **R42: may cause sensitisation by inhalation**
- Dermatitis - from skin contact with the paint or component chemicals **R43: may cause sensitisation by skin contact**
- Conjunctivitis - from splashes to the eye **R36: irritating to eyes**

- arrangements for prompt reporting of symptoms of sensitisation to a named responsible person, ie employer or manager;
- records of health surveillance (retain for up to 40 years).

Train people working with isocyanates to recognise the symptoms of sensitisation and how to report them. Give them copies of *Breathe freely*.<sup>8</sup> Where, as a result of exposure, an employee suffers an adverse health effect or identifiable disease, eg asthma:

- review the risk assessment and any control measures;
- if considered necessary, transfer the employee to other work where there is no risk of further exposure;
- review the health of other employees who may have been exposed.

Employers also have a duty to protect workers who develop symptoms which may be related to isocyanates while the cause of the asthma is being investigated.

## What are the legal requirements?

The Control of Substances Hazardous to Health Regulations (COSHH) require employers and self-employed people to consider risks to the health of their employees and other people, including members of the public.<sup>9</sup>

Isocyanates have a maximum exposure limit (MEL) of 0.02 mg/m<sup>3</sup> (8-hour time weighted average) and short-term exposure limit (STEL) of 0.07 mg/m<sup>3</sup> (15-minute reference period). Exposure to any substance assigned a MEL must be reduced to the lowest level that is reasonably practicable, and in any case below the MEL. (NB: Proposed changes to UK's Occupational Exposure Limit framework emphasise the principles of good occupational hygiene control with a single limit as a backstop. If adopted, it is most likely that the current MEL values will go forward unchanged into the new system.)

The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) require employers to report any medically confirmed cases of asthma arising from exposure to isocyanates at work.

Under Pollution Prevention and Control legislation the refinishing of motor vehicles is a controlled process which may require an authorisation. Contact your local authority environmental health department for more information.

## References from HSE books

- 1 *Isocyanates: Health hazards and precautionary measures* Environmental Hygiene Guidance Note 16 (Fifth edition) 1999 ISBN 0 7176 1701 7
- 2 *COSHH essentials: Easy steps to control chemicals. Control of Substances Hazardous to Health Regulations HSG193* (Second edition) 2003 ISBN 0 7176 2737 3. It can also be freely accessed at [www.coshh-essentials.org.uk](http://www.coshh-essentials.org.uk)
- 3 *Maintenance, examination and testing of local exhaust ventilation* HSG54 ISBN 0 7176 1485 9
- 4 *Organic isocyanates in air* MDHS25/3 (Third edition) ISBN 0 7176 1668 1
- 5 *Biological monitoring in the workplace* HSG167 ISBN 0 7176 1279 1
- 6 *The selection, use and maintenance of respiratory protective equipment* HSG53 ISBN 07176 1537 5
- 7 *Health surveillance at work* HSG61 ISBN 0 7176 1705 X
- 8 *Breathe freely: A workers' information card on respiratory sensitisers* INDG172 (single copies free or priced packs of 25 ISBN 0 7176 0771 2)
- 9 *Respiratory sensitisers and COSHH: Breathe freely - An employers' leaflet on preventing occupational asthma* INDG95(rev2) (single copies free or priced packs of 15 ISBN 0 7176 0914 6)

## Further information

HSE Books, PO Box 1999, Sudbury, Suffolk CO10 2WA Tel: 01787 881165 [www.hsebooks.co.uk](http://www.hsebooks.co.uk)

HSE Infoline 08701 545500 e-mail: [hseinformationservices@natbrit.com](mailto:hseinformationservices@natbrit.com). HSE Information Services, Caerphilly Business Park, Caerphilly CF83 3GG

**This leaflet contains notes on good practice which are not compulsory but which you may find helpful in considering what you need to do.**

Single free copies of this leaflet are available from HSE Books and can be downloaded from HSE's website. Priced packs of 10, ISBN 0 7176 2756 X, are available from HSE Books.

For details of providers of health surveillance and other occupational health services contact HSE's Employment Medical Advisory Service (EMAS) at your local HSE office, your MVR trade association or your trade journal.

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Spraying 2-pack paints produces the highest exposures and is one of the main causes of occupational asthma in the UK. The fine airborne paint mist is not visible under normal lighting and people may not be aware of the risk. Although brush or roller application of the paint does not create much mist, small amounts of isocyanate vapours released during the process may also be a risk to health. Exposures could also occur during paint mixing, hardening or curing of painted surfaces, and cleaning of spray guns.

If inadequately controlled, isocyanate mist and vapours may spread beyond immediate work areas, putting the health of other people, eg members of the public, at risk.

When using 2-pack paints for refinishing or repainting, including small areas of work such as scratches and stone-chips (SMART repairs), your precautions must ensure that exposure of the user and anyone else in the vicinity to isocyanate is kept as low as is reasonably practicable. Effective control measures (see below) can reduce exposures to non-detectable levels and certainly well below UK exposure limits.

#### What precautions should be taken?

Do **not** do any work involving 2-pack paints without a suitable and sufficient assessment of the risks to the health of anyone who may be affected (see *COSHH essentials*<sup>2</sup>).

All work with 2-pack paints must be properly managed, and everyone involved, including managers and supervisors, sufficiently trained to understand the hazards and precautions. Training should include the emergency action for dealing with spillages of material containing unreacted isocyanate or release of isocyanate vapour, as well as the treatment of splashes onto the skin or eyes.

#### Measures for controlling exposure

##### *Paint mixing and brush or roller application*

**Minimise** vapour levels in the breathing zone of the mixer/painter. Carry out this work only in either a well-ventilated (ie at least ten air changes per hour) mixing/painting room with the doors closed or a ventilated booth/enclosure. Wear appropriate respiratory protective equipment (RPE) for brush/roller painting jobs greater than 10 cm<sup>2</sup>.

**Reduce** the risks from splashing onto the skin and into the eyes. Wear appropriate personal protective equipment (PPE).

##### *Paint spraying*

**Control** the spread of paint mist. Only spray 2-pack paints in an enclosed and adequately ventilated spray booth/enclosure. Filter emissions and discharge to a safe place in the open air.

**Reduce** the risks from inhalation and contact with eyes and skin. Wear appropriate RPE and other PPE during spraying and, if remaining in the booth/enclosure, keep it on beyond the clearance time for isocyanate. Do not remove RPE to inspect newly painted areas. (NB: Airborne isocyanates remain at high concentrations after spraying - for ten minutes or more, even with the ventilation system running.)

##### *Paint hardening/curing*

**Control** isocyanate vapour given off while the paint hardens/cures. Leave vehicles in the ventilated booth/enclosure/baking oven until the process has finished. Do not allow anyone to enter without appropriate RPE/PPE until the vapour has cleared.

##### *Spraygun filling and cleaning*

**Prevent** uncontrolled releases of isocyanate during spraygun filling and cleaning, eg use a sealed, dedicated gun-cleaning machine.

#### Measures to control exposures

Plant, equipment and methods of working to control exposure to isocyanates must be effective and maintained in efficient working order, good repair and, in the case of PPE/RPE, be kept clean.

##### *Spray booth/enclosure*

Spray booths/enclosures should be capable of containing all paint emissions and be maintained in good condition. Thoroughly examine and test the exhaust ventilation equipment at least once in every 14 months.<sup>3</sup> Keep records of all checks and repairs for at least five years. Regularly inspect for leaks at door seals etc. Use air sampling or smoke tubes as aids.

Monitor the effectiveness of all control measures to ensure that exposure is being maintained as low as reasonably practicable. Measuring isocyanates in air can be difficult.<sup>4</sup> Biological monitoring involving the analysis of urine samples to monitor isocyanates absorbed into the body may be more reliable.<sup>5</sup>

Ensure that the extraction is always switched on during spraying and drying, eg use the booth/enclosure light switch to control its operation.

##### *Respiratory protective equipment (RPE)*<sup>6</sup>

Wear air-fed breathing apparatus where there is a risk to health from isocyanate mist and vapours. Some types of RPE offer protection against both inhalation and splashing:

- **full-face, air-fed respirator** - this type offers the best protection;
- **compressed air-supplied visor (type TH3)** - this is the most commonly used RPE equipment in MVR;
- **positive-demand, half-face, air-fed respirators** - must be worn with suitable face and eye protection, eg full-face visor. (NB: On its own, this type of RPE provides a lower level of protection than is offered by type TH3 above.)

Seek your supplier's advice on how to check that the RPE fits the wearer correctly and follow their instructions on cleaning, inspection and maintenance. Do not store RPE in the spray booth/enclosure or anywhere where it could be contaminated.

The quality and quantity of breathable air supplied to RPE are very important. Site the air inlet so that clean air is drawn into the compressor, and regularly check any filters in the airline. Ensure the compressor is capable of providing the required quantity of air when all air-driven equipment in the system is in use at the same time. Follow maintenance schedules recommended by the compressor manufacturer and check breathing air quality.

##### *Other personal protective equipment (PPE)*

Where there is a risk of splashing, wear coveralls and hand (eg soft nitrile, latex-free gloves) and eye protection. During spraying, wear a full-face, air-fed respirator or face visor for face and eye protection. Keep PPE clean and properly maintained and do not store it where it could be contaminated.

#### Health surveillance

High-level health surveillance is normally needed for people exposed to work with 2-pack paints.<sup>7</sup> It should be carried out by an occupational health nurse or medical practitioner familiar with the principles of health surveillance and the risks of the process, and should include:

- a pre-employment assessment, including baseline lung function measurement;
- a list of checks and tests to identify relevant symptoms (at six and 12 weeks after starting work with isocyanates, and then annually);