

SMART paint spraying

How to control health and safety risks



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Introduction

Who is this leaflet for?

This guide is for SMART (small and medium area repair technique) repair sprayers using isocyanate-based and other paints and who generally have no fixed place of work. It is also useful for franchisees, managers and operators in motor vehicle repair bodyshops, who manage, carry out or commission SMART type repair. It replaces the previous version, published as *Motor vehicle repair: Good practice for SMART sprayers* (WEB33).

What is it about?

It describes how to control risks to health and safety from paint spraying in SMART repairs. These procedures are normally sufficient to achieve 'adequate control' for SMART spraying techniques, as defined under the Control of Substances Hazardous to Health Regulations 2002 (COSHH).

Paints include surface coatings that are dried or cured by infrared or UV light, chemical hardeners or other means. Some of the paints and lacquers used in SMART repairs contain isocyanates.

There is a chance of developing occupational asthma when working with isocyanate-based paints/lacquers, and also of developing dermatitis from these and other 'reactive' products. If you become affected you will probably never be able to work with these products again.

How can it help me?

This leaflet can help you with your COSHH assessment. That assessment may show that different controls apply in your circumstances. You will need to record any such conclusions unless you are self-employed or an employer with five employees or fewer, although it is still useful so you can review it at a later date, eg if something changes.

This publication supports existing guidance on the subject. See HSE's motor vehicle repair site (www.hse.gov.uk/mvr) and particularly the publications *Safety in isocyanate paint spraying*¹ and *Isocyanate paint spraying: Safely managing spray booths and rooms*² for further details.

What are the key precautions for SMART spraying?

- Wear suitable respiratory protective equipment.
- Keep other people away from spray mist.



Figure 1 Well-defined external area ready for SMART spraying

What is SMART spraying?

SMART spraying is the spray application of a surface coating to parts of motor vehicles as part of a repair, usually outside the customer's house or place of work. The parts coated should not extend to a complete panel or panels.

Typically, SMART spraying is by:

- mini-spray gun or airbrush, normally having an inlet pressure up to 2 bar, delivering a volume of air much less than 150 l/min and a fluid flow well below 100 g/min; or
- pre-packaged aerosol spray can.

The quantity of paint sprayed is unlikely to exceed 25 ml per coat. The time spent spraying paint is unlikely to exceed 1 minute per coat, although the spray job may take a few minutes.

Bodyshops are now using similar techniques to SMART spraying to decrease throughput times in their workshops. If greater quantities are to be used (than specified above) or spraying time is likely to be longer than a few minutes in total, then further control measures will be required to achieve adequate control (eg spraying in a suitable spray booth/room).

The exact definition of what is or is not SMART spraying is not important as long as the exposure to the hazardous substances is well controlled.



Figure 2 Typical SMART repair

Paint hazards and risks

Conventional paint spraying products

Conventional spraying products are solvent-based, commonly known as 'cellulose paints'. The health risks from spraying typically include irritation of eyes, nose and throat, and mild reversible effects on the body, which usually do not cause permanent damage in the small quantities commonly used.

Isocyanate SMART spraying products

SMART spraying products are reactive – one-pack products, or two-pack products that require mixing before use. The products may be solvent-based or water-based. The health risks depend on the chemistry, but for **'reactive'** products:

- isocyanate-based products (including water-based isocyanate products) may cause asthma and dermatitis;
- UV-curable products may cause dermatitis (and may contain isocyanate);
- other products (eg acid-cured) may cause effects at least as serious as solvent-based products, including irritation of eyes, nose and throat, and mild reversible effects on the body.

Table 1 Some common misconceptions about isocyanates

False	True
Isocyanates contain cyanide that poisons you.	Isocyanate doesn't contain cyanide.
Isocyanates cause cancer.	Isocyanates cause asthma.
Isocyanates get into the body through thin skin, eg around the eyes.	Isocyanates get into the body by breathing in mists.
I'm safe – there's no history of asthma in my family.	Isocyanates can cause asthma in anyone who is exposed. Smoking makes developing asthma more likely.
My paint doesn't contain isocyanate, so it is perfectly safe.	Auto paints are 'dangerous for supply'. Read the safety data sheet!

Storage

Keep the quantities of stored paint products to a minimum. If other SMART products contain peroxides (eg activators for polyester resins used with fillers or fibreglass), these must be kept apart and stored in a sealed metal container.

Controlling risks

Training and competence

SMART sprayers should be trained to:

- understand the hazards and risks, and how to control them;
- recognise the signs of ill health, and what to do about them;
- use equipment, RPE and products safely;
- maintain equipment and RPE;
- decontaminate and dispose of waste properly.

SMART sprayers should be able to provide evidence of training from their franchiser, product supplier or professional training provider.

Respiratory protective equipment (RPE)

The sprayer needs to ensure that suitable RPE and other personal protective equipment (PPE) is worn, including when SMART spraying is carried out externally. When SMART spraying with **reactive products**, the sprayer will also need skin protection.

Some reactive products may contain isocyanates. If this is the case, RPE needs to be air-fed with an assigned protection factor (APF) of 20 or higher, eg LDM2 air-fed half mask or LDH3 air-fed visor. Filtering RPE is not suitable for spraying products containing isocyanates.

Suppliers of RPE for spraying will be able to advise you further.



Figure 3 Air-fed mask



Figure 4 Air-fed visor



Figure 5 Filtering RPE for non-reactive products

The compressor must deliver enough clean air for the air-fed RPE to work properly (in addition to the air needed for the spray equipment). To prevent the breathing air supply getting contaminated, you should keep the compressor and its air intake upwind or outside of the spray area and clear of other harmful substances.

Note: It is recommended that you use the same types of PPE when spraying with **non-reactive products**. However, half-mask filtering RPE with an assigned protection factor (APF) of 10 or higher, or disposable RPE with the same APF, can be used instead of air-fed RPE for these less hazardous products.

RPE has to fit and work properly every time it is worn. Fit testing and training in use and maintenance is essential and can be arranged through the RPE supplier or by training organisations.

Testing and maintenance

- Check that there is a good flow of clean air to your respirator every time you put RPE on. Air-fed visor RPE should have low-flow alarms.
- At least once a week, check that the compressor and air lines are in good condition and that the filters and traps are clean. Record these checks in a log book, with details of any parts replaced (eg exhalation valves for half-mask respirators, face seals for visors).
- BS EN 529:2005 recommends that the volume flow and quality of the supplied air should be thoroughly tested at suitable intervals as specified by a competent person after risk assessment.³

Other PPE

- If you use a half-mask respirator, you may also need chemical protective goggles.
- Use overalls with a hood.
- Use single-use gloves. Nitrile gloves are suitable. Single-use gloves are disposable – throw them away after each spray application.

Figure 6 Chemical protective goggles



Figure 7 Protective gloves



Record keeping

Keep written records of:

- RPE testing;
- testing the compressor reservoir air filters;
- air quality testing;
- disposal of hazardous wastes;
- periodic testing of pressure and electrical systems.

These records should be available for inspection.

Separate confidential records for health surveillance and biological monitoring (see below) should be kept secure by relevant authorised persons.

Spraying location

Regardless of where the spraying takes place, you need to prevent unprotected people being exposed to the spray. The sprayer needs to ensure that suitable RPE and other PPE are worn.

Spraying outdoors

Keep anyone without air-fed RPE a minimum of 5 metres, but preferably 10 metres, away from spraying. At this distance, there is minimal health risk to other people.

Wear all RPE and other PPE for gun priming, spraying and gun cleaning. Keep wearing it all until the job – including gun cleaning – is finished.



Figure 8 Spraying outdoors in a cordoned-off area

Spraying indoors

If spraying indoors, you should preferably use a spray booth or spray room and, as for conventional paint spraying, adopt the same controls (including RPE).

These controls are explained in HSE publications *Safety in isocyanate paint spraying* and *Isocyanate paint spraying: Safely managing spray booths and rooms*.

Workshop spraying

Spraying in a workshop with SMART spraying techniques should only be carried out when:

- everyone without airfed RPE is prohibited from the room during your work; and
- RPE is always worn until you leave the room; and
- all RPE/PPE is also worn for gun priming and gun cleaning.

Even when using a spray booth, spray room or capture unit, sprayers still need to wear airfed RPE and PPE, and bystanders should be excluded when using isocyanate-based products. The duty is to control exposure to isocyanates to 'as low as is reasonably practicable' (ALARP).

There is more guidance on capturing paint mist in the HSE publication *Controlling airborne contaminants at work: A guide to local exhaust ventilation (LEV)*.⁴

When products containing isocyanates have been used, wear air-fed RPE when re-entering the workshop. The time for this requirement is generally considered to be 30 minutes but this can be adjusted to longer or shorter times, depending on the workshop layout, design and ventilation performance.

Monitoring and health

Monitoring exposure

Currently, the only practical way to monitor the personal exposure from isocyanate spraying (from all routes of exposure) involves the worker providing a urine sample at the end of a shift.

A urine sample should be taken from SMART spray painters who may have potentially significant exposure to isocyanates. In the case of SMART sprayers, factors pointing towards 'significant exposure' may include where the spraying is carried out (eg in the workshop), the amount of isocyanate paints sprayed (larger repair dimensions), the number of times being sprayed during the shift and the use of unsuitable RPE etc.

Test results above the biological monitoring guidance value indicate the failure of exposure controls which should then be investigated and effective action taken to ensure they are fully implemented. Repeat samples should be taken to check that controls are working and preventing further exposure. For more information see the HSE publication *Urine sampling for isocyanate exposure measurement*.⁵

Where it is required, this urine sampling should be carried out at least yearly. For new employees, a sample should be taken during the first few months to show that the controls and working practices are providing protection.

Health surveillance

You should also provide health surveillance for your employees to check for signs of dermatitis and for those using paints containing isocyanates – they should also be checked for signs of asthma. If you are self-employed, you are advised to undergo health surveillance.⁶

Urine testing (see above) for isocyanates only checks whether the worker has been exposed, not whether their health has been affected.

The signs of ill health include the following:

Asthma

- Recurring sore or watering eyes.
- Recurring blocked or running nose.
- Persistent cough.
- Chest tightness (often occurring outside work hours).
- Wheezing.
- Breathlessness.
- Flu-like shivers.

Dermatitis

- Skin redness or soreness.
- Itching.
- Rash.
- Skin cracking or peeling.

If you develop abnormal symptoms you should tell your employer immediately or, if you are self-employed, you should seek advice from an occupational health professional (eg doctor or nurse).

Other SMART spraying risks

- Cleaning the spray gun with thinner, then spraying dry, produces the same hazards as spraying paint. Use the same controls as for spraying.
- Cleaning your hands with thinners can cause dermatitis. Use suitable skin cleaning products.
- UV lamps produce radiation that is harmful to the eyes and exposed skin. Control the risk – keep everyone away from UV lamps, and arrange screens to stop reflected light.
- Inspect and test electrical equipment regularly (eg once a year).
- The compressor is a 'pressure system', so you need to have the compressor reservoir examined regularly. Your insurance company can advise you on how often you should do this.
- Products used in spraying are usually flammable or highly flammable. They require safe storage.
- The small quantities of products used in SMART spraying mean that any fire risk is only likely to be within 15 cm of the sprayer nozzle.
- Carry a fire extinguisher containing carbon dioxide or dry powder. Replace it when it reaches its expiry date. Exclude ignition sources (eg no smoking, naked flames or grinding wheels) while spraying.
- Keep out of traffic routes and away from moving vehicles. For work in car parks or on public roads, wear a high-visibility vest over your overalls.
- Secure safe access for working at height. A tower scaffold or other working platform is preferable to a ladder. **Never work from the top of your van.**

References

1 *Safety in isocyanate paint spraying* Leaflet INDG388(rev2) HSE 2013
www.hse.gov.uk/pubns/indg388.pdf

2 *Isocyanate paint spraying: Safely managing spray booths and rooms* HSG276
HSE 2013 www.hse.gov.uk/pubns/books/hsg276.htm

3 BS EN 529:2005 *Respiratory protective devices. Recommendations for selection, use, care and maintenance. Guidance document* British Standards Institution

4 *Controlling airborne contaminants at work: A guide to local exhaust ventilation (LEV)* HSG258 (Second edition) HSE Books 2011 ISBN 978 0 7176 6415 3
www.hse.gov.uk/pubns/books/hsg258.htm

5 *Urine sampling for isocyanate exposure measurement* COSHH essentials sheet G408 HSE 2006 www.hse.gov.uk/pubns/guidance/g408.pdf

6 *Health surveillance for occupational asthma* COSHH essentials sheet G402
HSE 2006 www.hse.gov.uk/pubns/guidance/g402.pdf

Further reading

HSE's motor vehicle repair website: www.hse.gov.uk/mvr/

BS EN 14594:2005 *Respiratory protective devices. Continuous flow compressed airline breathing apparatus. Requirements, testing and marketing. Guidance documents* British Standards Institution

Review of commercially available party fog machines suitable for determining the clearance time of paint spray booths and rooms HSL/2006/43 Health and Safety Laboratory 2006 www.hse.gov.uk/research/hsl_pdf/2006/hsl0643.pdf

Health and safety in motor vehicle repair and associated industries HSG261 HSE Books 2009 ISBN 978 0 7176 6308 8 www.hse.gov.uk/pubns/books/hsg261.htm

British Standards

British Standards can be obtained in PDF or hard copy formats from BSI: <http://shop.bsigroup.com> or by contacting BSI Customer Services for hard copies only Tel: 0845 086 9001 email: cservices@bsigroup.com.

Further information

For information about health and safety, or to report inconsistencies or inaccuracies in this guidance, visit www.hse.gov.uk/. You can view HSE guidance online and order priced publications from the website. HSE priced publications are also available from bookshops.

This guidance is issued by the Health and Safety Executive. Following the guidance is not compulsory, unless specifically stated, and you are free to take other action. But if you do follow the guidance you will normally be doing enough to comply with the law. Health and safety inspectors seek to secure compliance with the law and may refer to this guidance.

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