

Safety in motor vehicle repair

Working with isocyanate paints



This is a web-friendly version of leaflet INDG388(rev1), revised 12/09

Introduction

This leaflet is aimed at owners, managers and supervisors of vehicle bodyshops – it may also be useful to employees. It explains the risks involved in using these types of paint and also shows how you can minimise the risks by taking the right precautions.

Almost all bodyshops will use paints containing an isocyanate hardener, which is used in some water-based paints and almost all lacquers (clear coats). Remember that 'water-based' does not mean 'isocyanate-free'.

A checklist at the end of the leaflet will help you prioritise the actions you need to take.

Dangers of breathing in paint mist

Breathing in isocyanate paint mist can cause asthma and vehicle paint sprayers are about 80 times more likely to get asthma than the average worker.

Early symptoms include one or more of the following:

- recurring blocked or runny nose;
- recurring sore or watering eyes;
- chest tightness, often occurring outside working hours;
- persistent cough;
- wheezing; and
- breathlessness.

Continued exposure may lead to permanent and severe asthma. There is no cure. Breathing in the smallest amount of isocyanate could then trigger an attack. Almost certainly, the sufferer would have to give up their current job.

The main source of isocyanate exposure is paint spraying. It may also occur from cleaning the spray gun and from baking. But you can prevent exposure and therefore the risk of asthma by having:

- properly designed spray booths and rooms;
- correct working procedures;
- appropriate personal protective equipment; and
- regular checks to confirm that the controls are working properly.

Spray booths and rooms

Restrict paint spraying to a properly designed spray booth or room.

A paint spray gun creates a visible fan of paint, and large quantities of paint mist that is invisible under normal lighting. The mist quickly spreads through the whole spray enclosure, enveloping the operator. Special lighting can show up this mist.

The ventilation air is overwhelmed by the spray-gun air jet and cannot, as is often imagined, instantly remove the paint mist.

The time taken for mist removal is known as the 'clearance time'. Typically, a booth clears in less than 5 minutes, a room can take 20 minutes or more.



*'Now you see it...'
Special lighting and black background show
paint mist enveloping sprayer*



*'Now you don't'
Under normal booth lighting the mist is
invisible*

Measure the clearance time – a 'party fog' machine is suitable for most car booths and will also show whether the booth or ductwork is leaking.

Clearance times may vary over a period. Initially, test regularly to check if this is the case. Once you know the likely worst case, you can reduce the frequency of tests. Clearance tests should also form part of the annual thorough examination and test.



Party fog machine

Put up a sign at all entrances to the booth or room showing:

- the clearance time (in large letters);
- when it was tested;
- who did the test;
- when the next test is due.

Commercial vehicle (CV) booths are much larger and the clearance test will require an industrial smoke machine.

Some CV booths have pits to spray the underside of vehicles. This can create a 'dead space' where mist can linger after the main booth has cleared and extraction or air blowers may be needed. Check the effectiveness of pit clearance by smoke testing.

Operate all spray booths and rooms at a slightly lower air pressure than the surroundings (at 'negative pressure') to prevent paint mist escaping into the workplace. Provide an indicator (such as a manometer) to show that negative pressure is being maintained and check it daily.



Example of a manometer fitted to a spray booth



Never lift your visor during the clearance time

Working procedures

Never spray isocyanate-containing paints in an occupied workshop or spray without air-fed breathing apparatus (BA). Even very small jobs, such as Small and Medium Area Repair Technique (SMART) work, will create high-exposure peaks.

Air-fed BA should be worn by anyone present in the booth or room during spraying, and throughout the clearance time.

Many sprayers lift their visors soon after spraying to check the work quality, not knowing they are still surrounded by invisible paint mist. This can cause significant exposure and should be prevented.

To leave a booth or room safely during the clearance time:

- walk to the pedestrian door wearing air-fed BA. The air hose must be long enough, and the connection point by the door;
- open the door, unplug the airline and hang it next to the door;
- step out, shut the door and remove the air-fed BA.

When gun cleaning, spray-to-dry in the booth or room wearing air-fed BA. Provide extraction for gun-cleaning machines that create mist.

Personal protective equipment (PPE)

Use visor-type, air-fed BA with a low-flow indicator, or half-mask BA (with constant airflow supply) when spraying isocyanate-based products. The mist is tasteless and odourless and filtering face masks can fail to protect without warning.

All BA users should be trained to wear it correctly, look after it, and test that it works properly. Air supplied to the BA should be uncontaminated and in sufficient quantity to protect the user.

Where there is a risk of paint splashing, wear coveralls and suitable gloves (eg disposable nitrile, or low-protein, powder-free latex) and eye protection.

Do not store any PPE where it could become contaminated.

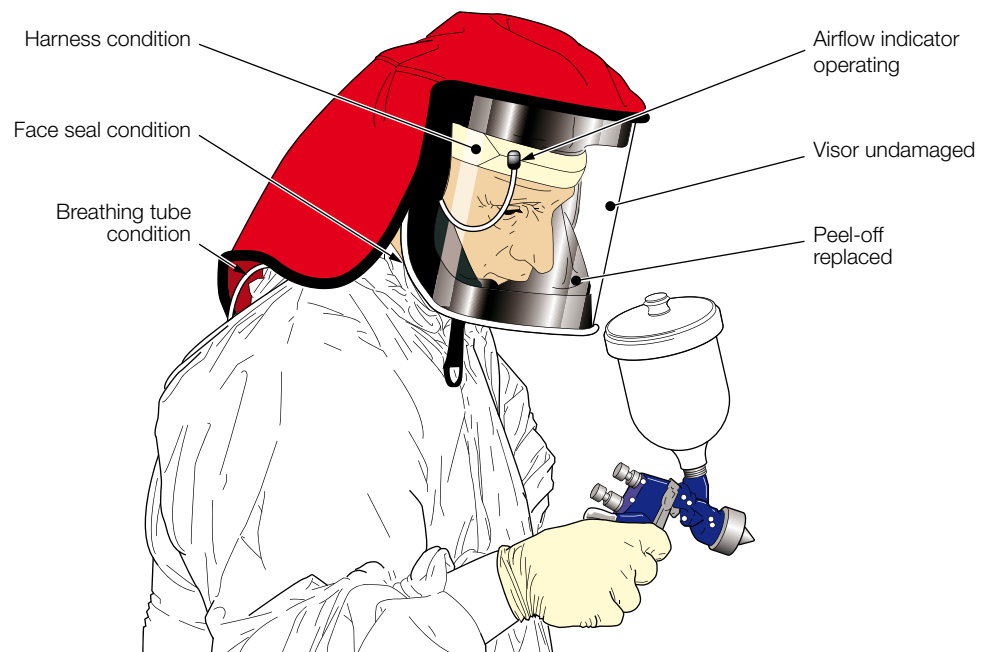
Check controls are working

Ensure that all the control measures continue to work properly. As well as routine checks and repairs:



Only use air-fed breathing apparatus

- spray booths and rooms need yearly 'thorough examination and test' by a competent person. This should include air velocity and smoke tests;
- train someone to examine all air-fed BA once a month, in line with the manufacturer's recommendations;
- keep maintenance records for at least five years.



Checks for breathing apparatus

Provide biological monitoring to check whether the combination of all the protective measures is working. It is the most practical way to monitor the control of personal exposure from isocyanate spraying and involves the worker providing a urine sample at the end of a shift.

Spray painters should be biologically monitored at least yearly. For new employees, carry out biological monitoring during the first few months to show that the controls and working practices are providing protection.

Provide health surveillance for paint sprayers – this normally includes:

- annual lung-function testing and a questionnaire. For new employees this should be carried out on beginning work; after 6 weeks; 12 weeks; and then yearly;
- skin checks for dermatitis (also for body preparation workers).

The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) 1995 require employers to report any medically confirmed cases of asthma or dermatitis caused by exposure to isocyanates at work.



Lung-function testing

Further reading

Health and safety in motor vehicle repair and associated industries HSG261
HSE Books 2009 ISBN 978 0 7176 6308 8

Biological monitoring in the workplace: A guide to its practical application to chemical exposure HSG167 HSE Books 1997 ISBN 978 0 7176 1279 6

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

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

Controlling isocyanate exposure in spray booths and spray rooms
WEB36 HSE 2008 www.hse.gov.uk/pubns/web36.pdf

Isocyanate paints can take your breath away Poster HSE Books 2010
ISBN 978 0 7176 6390 3

Checklist for spraying isocyanate paints safely

Questions you should ask	Yes/No
Are workers aware that they use isocyanate-based paints? Get data sheets from the supplier (but note alternative terms such as 2-pack, 2K, blocked isocyanate, polyurethane etc).	
Do they know that isocyanates can cause severe occupational asthma and that the warning signs are: <ul style="list-style-type: none"> ■ recurring soreness/watering of eyes and blocked/running nose; ■ bouts of coughing; ■ chest tightness, wheezing or breathlessness; ■ any other persistent history of chest problems; ■ symptoms improve at weekends or during holidays? 	
Is spraying of isocyanate-based paints limited to an extracted room or spray booth?	
Has the booth or room extraction system been thoroughly examined and tested in the last 14 months?	
Does the booth/room have a gauge to show it is under 'negative pressure'? Is the gauge checked every day?	
Is the paint mist filtered and discharged safely outside? Are filters blocked or missing?	
Is the clearance time of the booth or room known and on display?	
Is airline breathing apparatus (BA) always used whenever spraying isocyanate-based paints?	
Is the supplied air clean, at the right pressure and in sufficient quantity to protect the BA user?	
Is the BA visually checked every time it is used and examined thoroughly every month?	
Is gun cleaning carried out using extracted or enclosed gun-washing equipment (or in booth/ventilated mixing room with normal controls and BA)?	
Are the sprayers having annual health checks for breathing (lung function and questionnaire)?	
Has a 'responsible person' been appointed to carry out skin checks?	
Is the isocyanate exposure of the sprayers measured yearly using urine tests?	

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

This leaflet is available in priced packs of 10 from HSE Books, ISBN 978 0 7176 6381 1. Single copies are free and a web version can be found at www.hse.gov.uk/pubns/indg388.pdf.

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