

Beyond the spray and mist.

Helping to reduce your exposure to Isocyanates

The last few years have brought increased levels of attention about the risks from Isocyanates, even in industries where many may have thought that adequate control measures may have been in place. Perhaps you already know there are potential risks from isocyanates – but do you know what the early signs of exposure are and how to best ensure that you are protected?

We can help you to protect your workers and keep you informed of potential risks. Whether you work as a spray painter in a motor vehicle repair shop, in construction spraying insulation foams, or using specialist polyurethane adhesives, sealants and coatings, isocyanates could pose a serious threat to your lungs and your overall health. Here is an overview of what you need to know about isocyanates to help stay safe.

What are Isocyanates?

Isocyanates are a wide and diverse range of highly reactive chemicals that are commonly used to react with compounds containing alcohol (hydroxyl) functional groups to create polyurethane polymers. A chemical containing two such isocyanate groups is called a diisocyanate, and various diisocyanates are commonly used in polyurethane paints and foams.

How could they affect me?

Inhalation

The main health effects⁽¹⁾ (2) of exposure to Isocyanate vapors, spray mists, and dusts may include:

- Irritation of the eyes, nose and throat.
- Wheezing, chest tightness, breathlessness and coughing.

Potentially all workers exposed to isocyanates are at risk of becoming sensitised to isocyanates, not just those with existing history of asthma, allergies or other respiratory conditions. Sensitisation can occur after a large single exposure or after repeated low level exposure. Once sensitised, even very low subsequent isocyanate exposures, or other triggers (such as cigarette smoke or cold air), can result in immediate or even delayed asthma attack symptoms.

Skin

Isocyanates are also skin irritants (causing inflammation and dermatitis) and there is some evidence that skin exposure can also cause respiratory sensitisation.

Eyes

Isocyanates are an irritant to the eyes. Splashes can cause severe chemical conjunctivitis.

Other health effects

Other health effects which have been reported include liver and kidney dysfunction. Isocyanates include compounds that are classified by the IARC as being possibly *possibly carcinogenic to humans*⁽³⁾.



Did you know?

In a recent study in the UK, 70% of spray painters interviewed stated that they lifted the visor of their air-fed respirator during spraying to inspect the quality of their work, or due to issues with seeing through their visor⁽¹⁰⁾.

By lifting the visor, even for a short period of time during spraying, they are significantly reducing the effectiveness of their RPE and so increasing their exposure to the fine invisible paint aerosols that have not had time to clear from the air.

When am I at risk?

The main source of worker exposure is from the inhalation of isocyanates, particularly when spray applying polyurethane paints, coatings, foams, glues and flooring compounds. Another significant source of exposure is the associated maintenance and cleaning of polyurethane spray equipment⁽⁴⁾

The fine aerosol mists and vapours generated by spraying can be readily inhaled and isocyanates and other components they contain can be readily absorbed in your lungs, as well as settling upon exposed skin and eyes. Application of isocyanate containing products by dipping, brush or roller, in a well-ventilated area, generally results in lower levels of risk to workers⁽⁵⁾.

Manual spray painting of 2 pack paints is the main cause of occupational asthma in the UK, see Figure 1⁽⁷⁾. Statistically, spray painters working in car body repair shops are at most risk, with many being forced to leave the industry having been sensitised and developed occupational asthma. However, workers in other industries such as construction and metal fabrication are also commonly exposed.

When cured, polyurethane products contain no free isocyanates and are not hazardous under normal use. However, the welding or burning of polyurethane coated surfaces can release a range of contaminants, including isocyanates⁽⁸⁾.

What can I do to protect myself?

Use appropriate controls

There are many ways of minimising personal exposures, but one of the most important ways is to only spray paints in properly designed spray paint booths or rooms, with proper working procedures, with well-designed and functioning ventilation. Spray painting causes both visible and invisible aerosol mists, that can remain in the air for many minutes or even hours after spraying has been finished. So, it is important to ensure that the spray booth runs at a slight negative pressure, and that workers who may enter the booth are aware of the booth clearance time (time taken for the ventilation to clear spray mist)⁽⁹⁾.

Get the equipment that you need

Respiratory, ocular and skin protective equipment is needed when spray painting isocyanate paints. Recommendations and regulations vary by country, so always check your national regulations.

- Air-purifying respirators

In many countries, it is permissible – as part of an effective respiratory programme – to use air-purifying respirators with appropriate filters. These may take the form of a half mask and goggles or a full-face mask with particulate filters in combination with organic vapour cartridges.

- Breathing apparatus

In some countries, due to concerns around the odour threshold for isocyanates being higher than the occupational exposure limits, supplied breathable air / breathing apparatus is mandated. Air-fed visors are commonly used, providing a continuous supply of clean breathable air into a visor that additionally protects the face and eyes.

- Eye and skin protection

Depending upon the respiratory protection being worn, appropriate goggles may be required to protect the eyes from splashes and exposure to aerosol mists. Furthermore, appropriate coveralls and gloves should be worn to prevent dermal exposure.

Once you have a sense of the hazards and risks in your workplace, you'll want to take a look at 3M's full range of respiratory protection products, safety eyewear and coveralls to find the right PPE for your application. Whether it be a half-face respirator*, full-face mask and filters* or a heavy duty powered or supplied air headtop (air fed visor); all of our products are designed to help you get the job done while you breathe comfortably and safely.

At any time, you can get in touch with one of our respiratory experts for personalised help on the selection and use of 3M products. Their job is help you through the process of selecting adequate and suitable products based upon your risk assessment, helping you keep your lungs safe so you can focus on what matters: doing your job properly and staying healthy for your loved ones and family.

Did you know?

- Spraying 2-pack isocyanate paints is the main cause of occupational asthma in the UK⁽⁶⁾.
- Car body repair shop spray painters are 90 times more likely to develop asthma compared with the rest of the UK working population⁽⁶⁾.
- About 50 spray painters per year in the UK are diagnosed with occupational asthma linked to isocyanate sensitisation⁽⁶⁾.

Causal agents most commonly reported during 2012–2016 (UK specific)

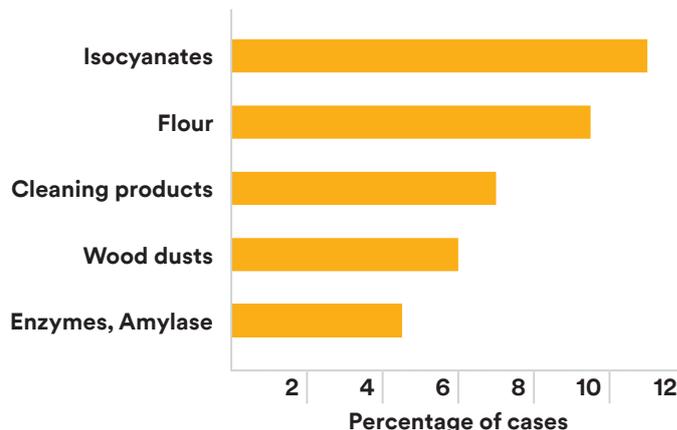


Figure 1 – UK occupational asthma statistics (2012-2016) causal agents⁽⁷⁾.

*See national guidance for suitability – supplied air breathing apparatus may be required.



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