

# RPE for Painting and Coating Industries

Including: **Isocyanates** – Your questions answered



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## Introduction

In this guide we answer all your questions on appropriate RPE for use while painting and coating, plus a specific FAQ section on Isocyanates, from what they are, to the dangers posed and what your responsibilities are in protecting your workforce.

While reducing and removing possibilities for exposure should always take priority, respiratory protection equipment (RPE) may well be needed at every stage of the painting or coating process. Selected RPE should be both adequate and suitable, as defined by the HSE:



### ADEQUATE

It is right for the hazard and reduces exposure to the level required to protect the wearer's health.



### SUITABLE

It is right for the wearer, task and environment, such that the wearer can work freely and without additional risks due to the RPE.

## The first step: Risk Assessment

A comprehensive risk assessment to determine suitability and adequacy of the RPE solution should include analysis of the type and concentration of the hazard, the environmental factors such as ventilation and space, the method of application, the work rate of the employee, the physical attributes of the employee and length of exposure time. These variable factors will all affect the necessary protection factor of the RPE and therefore the type chosen.

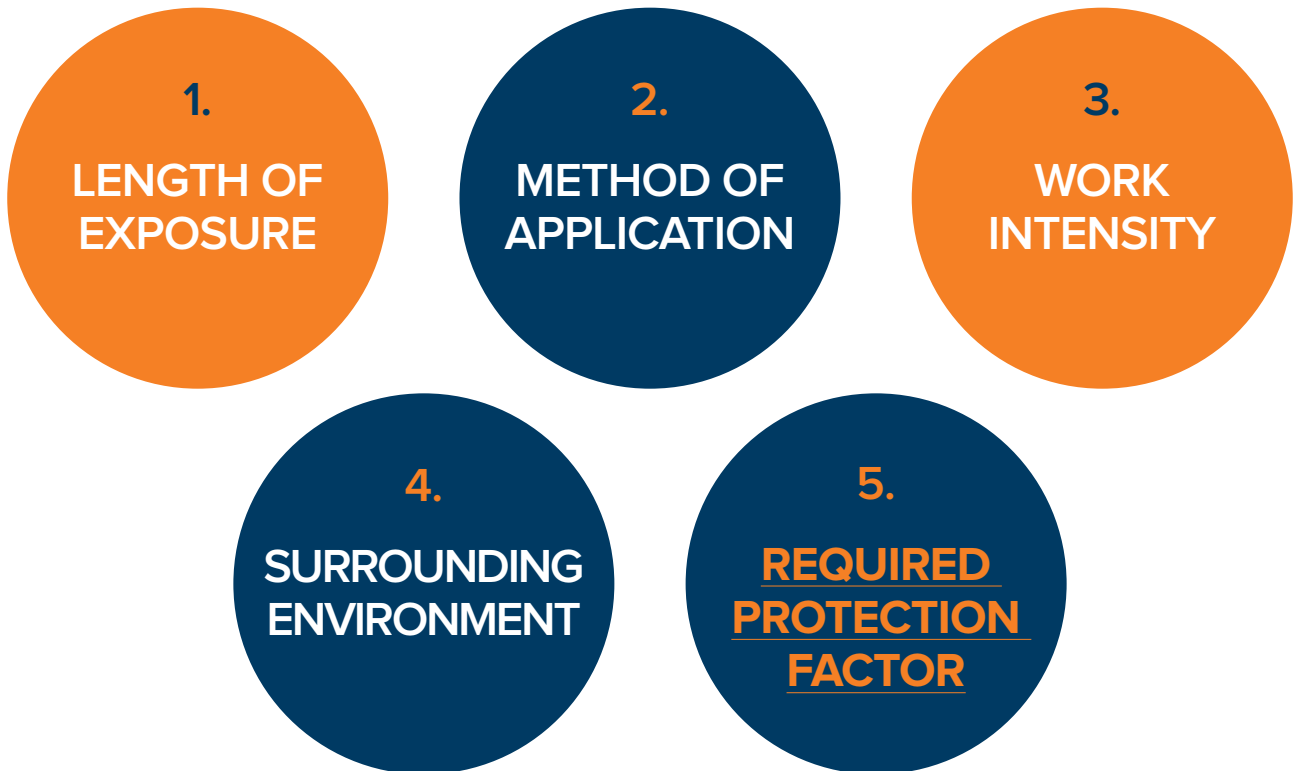


## Preparation

Whatever the surface, sanding, stripping, debrading or filing can expose workers to harmful mists, vapours and dusts, either from the surface, or from the products used. Both eyewear and RPE are necessary to protect from any of these not removed by damping down and dust extraction equipment.

## Painting – consider the wider picture

Paints vary in their levels of hazardous materials and in the protection considered adequate while using them. Water based paints may sometimes contain relatively low levels of harmful ingredients, but this is not the only consideration when assessing the level of risk and deciding on protection:



Solvent based paints are particularly high in volatile organic compounds (VOCs), including isocyanates, which can lead to unpleasant health effects. VOCs are invisible, and spread through the air like smoke. You can find more information about isocyanates on pages 13-18 of this guidebook.

## The risks of VOCs

Short term exposure threatens many symptoms which can increase the possibility of an accident occurring:

### Short-term exposure:



IRRITATION



HEADACHES



DIZZINESS



VISUAL IMPAIRMENT



TEMPORARY LOSS OF MEMORY

### Long-term exposure:



FATIGUE



LOSS OF MOTOR COORDINATION



VERTIGO



DIZZINESS, NAUSEA, AND VOMITING



OCCUPATIONAL ASTHMA\*



ORGAN DAMAGE\*

\* Occupational asthma and asthmatic symptoms such as nocturnal breathlessness, increased bronchial problems and decreased lung function.  
+ Organ damage (mainly to the liver and kidneys) and nerve damage.

HSE guidance on assessment and control of solvents must be followed at all times:  
[www.hse.gov.uk/construction/healthrisks/hazardous-substances/solvents.htm](http://www.hse.gov.uk/construction/healthrisks/hazardous-substances/solvents.htm)

## What equipment do you need?

RPE is the last line of defence for any painter and is particularly important with paints containing VOCs.

In some situations, **a powered air purifying respiratory (PAPR) system** can be a suitable option, as it allows movement and flexibility and is compatible with suitable filtering for the dangerous organic compounds involved.

PAPR systems, which effectively filter contaminants from the ambient air, have been developed to be lightweight and comfortable to wear, with lithium-ion batteries which can last for up to 8 hours.

Where atmospheres are potentially explosive, intrinsically safe components are available to prevent ignition by significantly reducing the energy in and number of sparks. Using these can make your PAPR equipment safe to use in zones rated ATEX 1, 2, 21 and 22.



[Anchor RPE range ▶](#)



## Fast compliance

Anchor Safety can supply you with **ready kits**, tailored to the needs of the painting industry, ensuring your compliance and the full protection of your employees.

[Anchor PAPR ready kits ▶](#)

## Flexible headtop options

Headtop options exist which ensure that even those with facial hair, or other situations preventing an adequate face fit, can still be fully protected, using a hood rather than a face-fitted mask.

Hoods are also available with integrated bump caps, helmets or eye protection to protect from additional mechanical hazards. These varying headtop options can potentially be compatible with both PAPR and Airline options, an extremely economic solution if both RPE systems are in use.

**Quality Control** - a flip mask allows the wearer to not only get a great view of their work, but also to lift it to examine it in close detail - although please note that masks should not be raised until all paint mist has completely dispersed.

**Always speak to an expert when determining the correct combination for your needs.**





## Industrial spray painting and powder based painting

Manual spray painting is one of the biggest causes of occupational asthma in the UK affecting those working with spray application of polyurethane paints, coatings, foams, glues and flooring compounds. The fine aerosol mists and vapours generated by spraying can be inhaled and VOCs including isocyanates can be easily absorbed by the lungs, while also affecting exposed skin and eyes.

**Vehicle Paint Sprayers are in fact 80 times more likely to get asthma than the average worker.**



## Control and reduce the hazard

Using a paint booth, a self-contained environment equipped with exhaust fans and filters, can make commercial spray painting safer and cleaner. It improves results by altering air pressure to blow contaminants out of the container and clear out overspray from the paint sprayers.



# Industrial spray painting and powder based painting

## Protect from exposure

As well as protecting eyes and skin from exposure it is advisable to use air-fed respiratory protection products where possible to achieve the correct protection factor for spray-painting. These products fall into two camps:

- ✓ self-contained breathing apparatus (SCBA)
- ✓ closed-circuit breathing apparatus, otherwise known as constant flow airlines.

Constant flow airlines are products designed to be used alongside a fixed breathable quality airline system, (delivering air quality in accordance with EN12021) perhaps inside a painting booth. The mask or hood is fed with constantly clean air for the worker to breathe, rather than relying on cleaning the surrounding contaminated air. The supplied air will be filtered, clean and at the right pressure. (NB. This is an entirely separate supply to compressed air, delivered for pneumatic tools.)

Supplied breathing air needs to be adequate for the RPD (respiratory protective device) being used, and, of course, should be safe to breathe, complying with UK standards BS EN12021 & EN12021:2014. The gas should be free from unpleasant smell or taste, approximately 21% oxygen, less than 500 ppm Carbon Dioxide and less than 5 ppm Carbon Monoxide. **UK regulations** insist that airflow systems have samples taken and are checked for condition, cleanliness and flow rate, every three months at least, depending on the frequency of use.

Protection from flammable atmospheres: Spray painting can create a potentially explosive mix of gases in the atmosphere surrounding activity. If PAPR equipment is being used, ATEX rated batteries and motors, certified for use in certain potentially explosive atmospheres, are available.

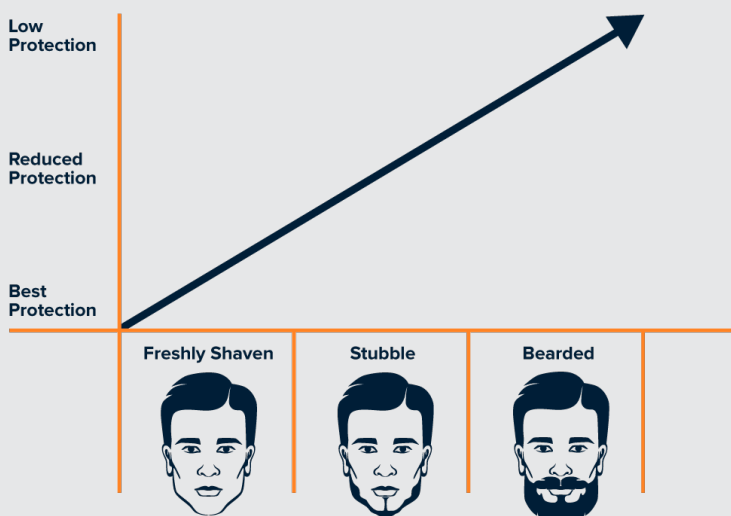
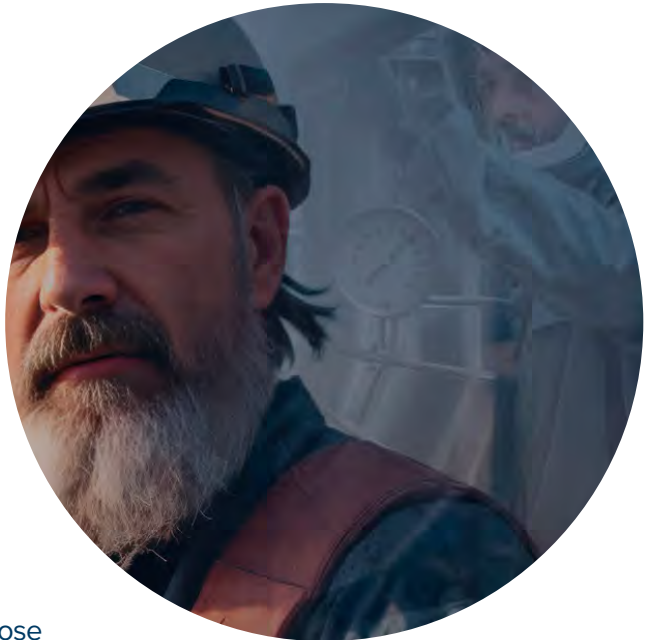


[Anchor RPE range ▶](#)

## The importance of face fit

A good face fit is essential when using a face mask of any type. If an adequate seal is not achieved, then it is likely that the wearer will inhale hazardous materials. Face fit testing ensures that the mask is the right size and achieves the tight seal needed. Everybody's face is a different size and so no one person's mask will fit in quite the same way as another's.

To achieve a perfect face-fit it is essential to be cleanshaven – if a beard is present, or even stubble, a clean seal with a mask is not possible. However, those with facial hair can still be protected with either PAPR, SCBE or constant flow airline supplied systems, by using a loose fitting hood.



[For more information on this see the Anchor Safety expert insight on RPE and beards.](#)

Facemasks and hoods should not be lifted until all paint mist has cleared, or until the worker has exited the hazardous area.

[Anchor Expert Insight ▶](#)



## Clean up

Cleaning and checking respiratory equipment is a vital part of its maintenance for safety as well as to ensure the wearer can continue to carry out high quality work. Detailed articles on maintaining and storing your equipment and replacing filters can be found in:

**Anchor Safety's Expert Insights:**

**<https://www.anchorsafety.co.uk/respiratory-protection-insights>**

Maintenance and cleaning of spray equipment and the RPE used while working is another significant source of exposure. Gloves, overalls and face masks should be worn to protect from splashes.

**Anchor Expert Insights ►**

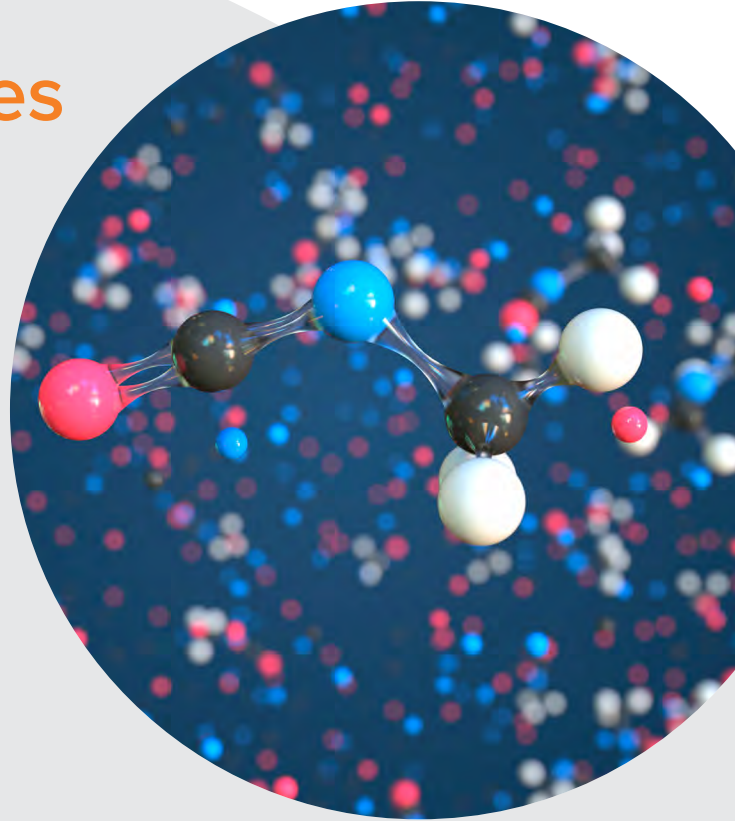
## Health Surveillance

The HSE states that urine testing should be carried out at least yearly, to ensure all practices are having the desired effect. All spray painters and others who may be potentially exposed should be tested. For new employees, a sample should be taken during the first few months to ensure that the working protocols are providing the necessary protection.



## What are Isocyanates

Isocyanates are a family of chemicals, highly reactive organic compounds, the raw ingredients in all polyurethane products. They are commonly used in polyurethane spray paints and varnishes, a variety of flexible and rigid foams, glues and laminating materials. Isocyanates can enter the atmosphere as a vapour. They are listed by the World Health Organisation as hazardous chemicals.



### Sources of exposure:

#### Where might you encounter Isocyanates in the workplace?

Spray paint: Isocyanates are most frequently encountered as a vapour in the automotive industry and vehicle body repair, while spray painting. Sanding of materials containing isocyanates may also release them in the form of dust.

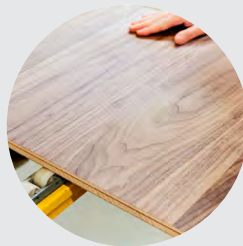
Isocyanates are also released into the atmosphere through thermal degradation: when materials using them are heated, for instance in hot wire cutting processes. This means they are also encountered in manufacturing and when working with the following materials and items:



INSULATION  
MATERIALS



SYNTHETIC RUBBERS  
& POLYURETHANE  
FOAMS



LAMINATED  
WOODS



SURFACE  
COATINGS AND  
ADHESIVES



FURNITURE,  
CAR SEATS,  
MATTRESSES

## Can Isocyanates be harmful?

Isocyanates are a powerful irritant. They can cause severe irritation to the skin, the mucous membranes of the eyes, the respiratory tract and the gastrointestinal system. Direct contact with skin or eyes can result in chemical conjunctivitis, blistering and swelling.

Harmful effects may be experienced after a single large exposure or repeated low-level exposures. The main effects of harmful exposure, are: ▶

### SENSITISATION

...is where the exposed person becomes allergic to irritants. This may occur after prolonged exposure, also resulting in occupational asthma, or skin reactions such as dermatitis, hives and rashes. Once sensitised, a person may then react badly to other irritants unrelated to isocyanates to which they were previously not allergic to.

### IRRITATION TO THE RESPIRATORY TRACT

...causes coughing, wheezing and shortness of breath. Occupational asthma may result from the damage to the soft tissues of the lungs. Isocyanates are the main cause of occupational asthma in the UK. With continued exposure, asthma may become permanent and severe.

### GASTROINTESTINAL DISTRESS

...such as nausea and vomiting may be reported, and some research points to isocyanates as a cause of liver and kidney disease.

## Can Isocyanates cause cancer?

Although a number of studies have linked isocyanates with a number of cancers in animals, there is currently no conclusive evidence that isocyanates can cause cancer in humans. The HSE clearly states that [links between isocyanates and cancer are a myth](#), and that no cases have been reported.

## How long do Isocyanates remain in the body?

Isocyanates are broken down in the body and are expelled in urine. This is why urine testing is a good way of monitoring your workforce to ensure exposures are being adequately controlled. If respiratory protection is not being used effectively, traces of breakdown products will be found in urine.



Anchor RPE range ►

## Your responsibility to staff at risk of Isocyanate exposure

Control of Substances Hazardous to Health (COSHH) regulations state that **an employer must protect workers** from the risks from isocyanates. COSHH regulations are a legal requirement for employers to comply with and failing to do this can result in fines of many thousands of pounds.



**Risk assessment:** Every employer must determine exactly what health hazards workers are exposed to and must devise a plan to prevent harm to health by carrying out a risk assessment. This should first address reducing or removing the possibility of exposure.



**Control Measures:** Control measures must be put in place and kept in good working order. Where exposure is a necessity, then adequate protection measures should be provided, staff trained in their use and equipment maintained.



**Education:** In addition to reducing, removing and protecting from the risks, the employer is also responsible for educating both employees and any other people at risk.



**Health Surveillance:** Continuing monitoring of those exposed, even while using RPE, should be carried out regularly - this is important to spot any asthma symptoms.



**Biological Monitoring:** HSE **recommends** that vehicle spray painters undertake biological monitoring annually. It may be sensible to plan annual isocyanate testing as part of a complete health surveillance programme.



## How can you prevent exposure to Isocyanates?

Many types of isocyanates cannot be detected by smell or taste at concentrations below the workplace exposure limit. As a result, filtering devices alone may not be adequate in spraying applications.

- ✓ **Employees must wear PPE.**
- ✓ Employees working in a spray booth should wear air-fed breathing apparatus for respiratory protection.
- ✓ Respiratory protection worn within a booth should offer a protection factor of 40 or more, and it is advisable that there is a low flow indicator, such as a warning whistle, as an added precaution.
- ✓ The booth must be running at negative pressure.
- ✓ There should be signage reminding employees to use best practices when handling hazardous chemicals - these chemical safety notices and hazardous goods labels should meet BS5378 standards - the British standard for safety signage.

[Anchor range ▶](#)

## Useful links:

Occupational asthma often goes undiagnosed because the early symptoms may not be automatically linked to work. This document from the HSE makes the risks clear.

<https://www.hse.gov.uk/mvr/assets/docs/paintmist.pdf>

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Monitoring employees for exposure to Isocyanates: This document explains the reasons for and meaning of urine testing for your employees.

<https://www.hsl.gov.uk/media/1664375/employees.pdf>

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Reducing ill health from exposure to Isocyanates in motor vehicle repair: HSE document

[https://www.hse.gov.uk/foi/internalops/sims/manuf/3\\_12\\_01.htm#appendix-5a](https://www.hse.gov.uk/foi/internalops/sims/manuf/3_12_01.htm#appendix-5a)

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Safety in isocyanate paint spraying

<https://www.hse.gov.uk/pubns/books/hsg276.htm>

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Explaining how to choose the correct protection factor for your RPE equipment

<https://www.draeger.com/Content/Documents/Content/protection-factors-k16-v02-999-en.pdf>

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For Airline systems: Breathing-Air Quality Testing Regulations, Standards and Guidance

[https://www.factair.co.uk/\\_webedit/uploaded-files/All%20Files/Regulations%20Booklet.pdf](https://www.factair.co.uk/_webedit/uploaded-files/All%20Files/Regulations%20Booklet.pdf)

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## About Anchor Safety

Established in 1988 in Ipswich Suffolk, Anchor Safety is a leading PPE supplier, known for supplying a comprehensive range of innovative, high-quality products, backed by unrivalled customer care. All with prompt, personal service from friendly, knowledgeable team and efficient delivery.

### The Anchor Safety RPE Experience

At Anchor Safety we pride ourselves on our total integrity in our dealings with customers, suppliers and staff. We are committed to reducing your workplace exposures, to embedding a strong safety culture and to creating a safer working environment.

Our highly specialised technicians work with clients in high hazard environments to design and implement effective, safe and hassle-free RPE programmes, supporting with a range of customer needs:

- ✔ Specialist technical expertise
- ✔ RPE product supply and lifecycle management
- ✔ Risk control and decontamination advice
- ✔ Educational programmes and best practice
- ✔ Consistency of compliance
- ✔ Face fit testing and servicing

We are able to cover all your respiratory protection needs for fast compliance, from standard FFP3 disposable face masks, to complete, ready to use PAPR kits. With a wide range of brands including Drager, BLS and 3M we can offer fully independent advice and a tailored solution for all businesses.

The Anchor Safety RPE Experience will help to ensure that your business is fully compliant and that every worker has access to the respiratory solution that will fully protect them.

**For more information and specialist support with your RPE requirements, get in touch with our expert team.**

**E** [experts@anchorsafety.co.uk](mailto:experts@anchorsafety.co.uk)

**T** 0800 328 5028

[www.anchorsafety.co.uk/respiratory-protection](http://www.anchorsafety.co.uk/respiratory-protection)