

Indecent Exposure

Stay protected against inhalation of hazardous substances



Exposure to hazardous substances can lead to long-term health problems and can even be fatal. Alasdair Nairn, UK operations manager at SGS, a leading inspection, verification, testing and certification organisation, explains how the correct use of respiratory protective equipment (RPE) protects the wearer against the inhalation of dangerous dusts, mists, fumes, vapours and gases, and what to consider when selecting, using and maintaining it.

RPE is a specific type of personal protective equipment (PPE), which is designed to protect an individual against the inhalation of substances that are hazardous to health. Although RPE comprises a broad range of options, it will not perform as intended if used incorrectly and mistakes such as wearing the wrong

RPE for the job could give users a false sense of security. RPE must be able to do the job expected of it, which is why it is important to understand how it should be selected, used and maintained.

Something in the air

Hazardous workplace substances include welding fumes; solvent vapours; gases such as chlorine, ammonia and carbon monoxide; silica and lead dust, phosphide, bacteria, viruses and parasites. Breathing one or more of them could lead to a range of respiratory diseases and conditions including asthma, chronic obstructive pulmonary disease and cancer. It can also lead to other diseases of the airways and lungs such as airway obstruction and bronchitis.

One of the most well known hazards requiring the use of RPE when being removed or disturbed is asbestos. This relatively common substance is still responsible for the deaths of around 5,000 individuals each year – a figure nearly three times more than the number of people killed on the UK's roads each year.

Asbestos was not banned completely in the UK until 1999 and the Health and Safety Executive (HSE) claims that up to two million commercial buildings still contain asbestos related materials, while the British Lung Foundation believes that there are 14 million homes in the UK that were built when it was regularly being used. Asbestos fibres cause cancers such as mesothelioma and lung cancer, and other serious diseases such as asbestosis and pleural thickening. ▶



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There is usually a long delay between first exposure to asbestos and the onset of the disease, which can vary from 15 to 60 years, so it is far from a problem of the past. Even so, there is no regulatory requirement for asbestos to be removed, as while products containing it are in situ and remain undamaged, they are not harmful. However, in situations where asbestos needs to be removed or disturbed due to maintenance or rebuilding work, there are strict guidelines in place to ensure that this is carried out safely and RPE forms an important part of the process.

Last resort

RPE should only be used where adequate control of exposure cannot be achieved by other means, and when all other reasonably practicable control measures have been taken. Those in a position of responsibility are initially required to attempt to eliminate the hazard at source. If people can still breathe in contaminated air, despite the introduction of other controls, it is vital to use RPE. This also applies if there are short-term or infrequent exposures and the use of other controls is impractical, or as an interim measure while more permanent control measures are being implemented.

The Control of Asbestos Regulations 2012 came into force on 6 April 2012 and state that those responsible for maintenance or repair of non-domestic premises, or common parts of domestic premises, have a ‘duty to manage’ the asbestos in them, and to protect anyone using or working in the premises from the risks to health that exposure causes. Relevant parties must identify where it is, its type and condition, assess the risks and manage and control these risks. A management survey provides information of all asbestos containing materials for the register while regular re-inspection surveys monitor the condition of these materials so that the information is kept up to date.

In the majority of cases, work with asbestos needs to be carried out by a licensed contractor. However, at an

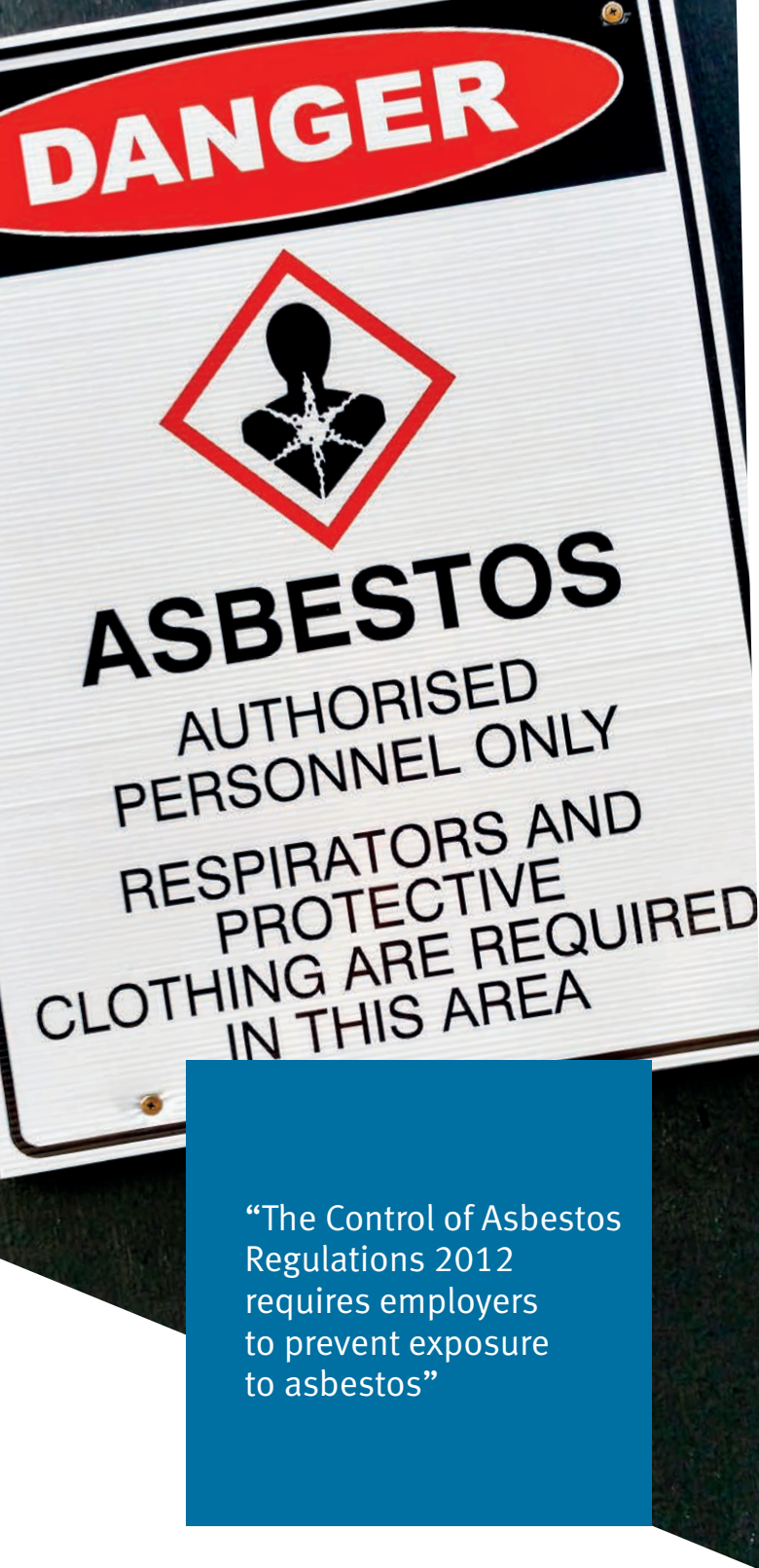
early stage, the expertise of a UKAS accredited asbestos analysis service provider should be employed to check the quality of the work and assess whether the area is suitable to be re-occupied at the end of the removal works. Analyst services can prove crucial to the removal process, the protection of workers and safety of other nearby persons. However, analysts do not provide supervisory control for asbestos work and do not directly carry out licensable work as defined in Regulation 2 of the Control of Asbestos Regulations 2012.

Risky business

People should never be put at risk, so RPE should be used where hazardous substances of any kind may be present in the air, where there could be a deficiency of oxygen, or where there is the possibility of a sudden high concentration of harmful substances. It is why a thorough risk assessment is vital to identify the harmful substances that are present and in what concentrations, how workers can be harmed and how to prevent exposure. This should always be carried out before any work begins to determine work activities for which RPE is mandatory.

A risk assessment can also require monitoring of the air in the immediate vicinity of the worker in order to gauge occupational exposure limits (OELs). The measured concentration of a substance, averaged over a working day (eight hours) or a short period within a day (15 minutes) can then be compared to a reference figure to determine whether actions are required to reduce exposure. If the measured exposure is above the OEL then control measures should be considered before selecting RPE.

Just as importantly, a risk assessment should identify when RPE, or certain types of it, should not be used. For example, air-purifying respirators should not be used when concentrations of contaminants are immediately dangerous to life or health, or when the concentrations exceed the maximum use concentrations established by ►



“The Control of Asbestos Regulations 2012 requires employers to prevent exposure to asbestos”

regulatory authorities. An example of this is where, even after the RPE has been factored in, control of personal exposure to within permitted limits cannot be established.

Rules and regulations

A number of regulations outline the types of circumstances when RPE should be used. These include the Control of Substances Hazardous to Health Regulations 2002, which requires all employers to ensure suitable RPE is supplied and used whenever there are risks to health and safety that cannot be adequately controlled by other means, while the Personal Protective Equipment at Work Regulations 1992 states that employers must only supply equipment that is CE marked.

The Control of Lead Regulations 2002 requires employers to provide appropriate RPE to protect staff working with lead if there are risks to health and safety that cannot be controlled by other means. Likewise, the Confined Space Regulations 1997 requires employers to carry out risk assessments of any work to be undertaken in a confined space and the Ionising Radiations Regulations 1999 stipulates similar parameters.


The Control of Asbestos Regulations 2012 requires employers to prevent exposure to asbestos whenever any work that is liable to disturb fibres is carried out, while employers must make sure that any work areas, plant

and equipment used for asbestos work are kept clean. It also requires the employer to make sure an area is thoroughly cleaned after work is finished and, as mentioned previously, many licensed asbestos removal companies choose to work with independent asbestos analysis service providers to ensure that workers are safe.

Type cast

RPE is divided into two main types – respirators and breathing apparatus. The former uses filters to remove contaminants in the air and comprise non-powered respirators that rely on the wearer’s breathing to draw air in through the filter, and powered respirators that use a motor to pass air through the filter to give a supply of clean air to the wearer. Respirators should not be used in atmospheres with oxygen deficiency – where the concentration of oxygen is below 19.5% – or where the concentration of unknown contaminants has not been evaluated.

Breathing apparatus utilises a supply of breathing-quality air from an independent source such as an air cylinder or air compressor, and can be used in an atmosphere with oxygen deficiency. Both respirators and breathing apparatus are available in a range of styles, including disposable facemasks, cartridge filter orinatal facemasks, half or full-face powered respirators, powered or air-fed hoods or visors, and air-fed suits. Deciding which to use should be based on ▶



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factors such as what the hazardous substances are, work rate, wear time, temperature and humidity of the work area, vision requirements, communication requirements, work area congestion, mobility, headwear and any medical condition that could make wearing RPE difficult for the wearer.

When the face fits

People's faces are different shapes and sizes, which means ensuring a piece of RPE fits the wearer well in order to work correctly and provide the expected protection is imperative, as even a tiny leak around the edge could let hazardous air bypass the filter, leaving the wearer exposed. Employers must offer training so that that RPE is used correctly, ensure that employees know how it works, explain why it is needed and advise how to maintain and store the RPE. A face fit test is normally repeated every two years but may be more frequent in circumstances where a wearer gains or loses weight, or there are alterations to their facial features that may affect the fit.

The HSE Approved Codes of Practice requires that qualitative or quantitative fit testing be carried out as part of the initial RPE selection process. Fit testing is a way of finding a facemask that suits a particular person, and employers and employees alike should understand its importance, and the principles of fit testing methods.

Recognised quantitative techniques include chamber based assessments using either particle or gas tracer techniques, where a probe is inserted into the breathing zone to detect if contaminants are migrating inside, through to PortaCount ambient particle counting methods. Qualitative taste based methods are only applicable to half facemasks and filtering facemasks. These often involve a hood being placed over an individual's head without the facemask being on and then a weakened concentration of Bitrex, or similar substance, is pumped into the hood via a small hole to determine how sensitive the subject is to taste. These tests can be carried out in independent laboratory conditions, with certification issued to confirm that the RPE meets the required standard.

Hair today gone tomorrow

Although fashionable amongst some men these days, beards, stubble, sideburns and other facial hair are a problem, as they can interfere with the initial testing process, as well as the day-to-day protection of close or tight fitting RPE.

Put simply, the less hair the better and to back this up, the HSE conducted a study that showed just how much a beard could affect the seal quality of RPE. It found that 'protection could be significantly reduced where stubble was present, beginning within 24 hours from shaving, and generally worsening as facial hair grew'. Most companies that work in environments that require RPE have therefore introduced a clean-shaven requirement into their health and safety policies.

Wear and tear

It stands to reason that RPE wear time should be reduced as far as possible, as it means that overall exposure to harmful substances is minimised. If most of the exposure occurs during a short period, it may be possible that

the RPE is only necessary during short processes, in order to achieve the adequate exposure reduction.

When dealing with asbestos, tight fitting non-powered facemasks – whether half or full face – should only be used for durations of one hour or less before a break is required. Take, for example, an analyst conducting the four-stage clearance test that confirms that work areas are thoroughly clean and fit to be returned to the owner/occupier. He or she must decontaminate and move to a safe area before removing the facemask and taking a break. RPE should only be worn for as long as it functions to required standards, so if the unit has powered air supply using a battery it can only be worn as long as the battery has adequate power. Similarly, if the filter medium becomes blocked due to high particulate density, the wearer must leave the area.

It should be remembered that RPE is low down in the control hierarchy and other measures to control exposure are preferable. In should be remembered that RPE can be uncomfortable to wear for long periods and may interfere with communications, while in hot conditions it could increase the risk of heat stress. ▶

Damage limitation

In the same way that poorly fitting RPE is ineffective, so too is equipment that is damaged or has reached the end of the manufacturer's expected service life. Obvious signs include when resistance is such that it is difficult to breathe through, when visibility on full facemask RPE is compromised, when battery units fail or when water affects working parts such as through inadequate drying or storage. Likewise, if the wearer can taste or smell the contaminant – something that is typical of absorbing type filters that act like a sponge – RPE should be replaced.

Trained personnel should check respirators before and after use, and undertake a thorough inspection during cleaning, which must be carried out diligently and carefully by using materials specified by the manufacturer. A competent third

party should also inspect most types of RPE on a monthly basis. In cases where working parts are more complex, as with self-contained breathing apparatus, a more vigorous inspection and service may be needed, which should be done in accordance with the manufacturer's guidance.

Lack of maintenance, or care when handling, can seriously affect the effectiveness of RPE, and may leave wearers more vulnerable to contaminants. Therefore, all RPE must be used and stored at the appropriate temperature and humidity in accordance with instructions. Keeping manufacturer instructions with an RPE system is a regulatory requirement, and they must be referred to if and when there is any doubt.

The wearer should also be assessed for their suitability to work in a specific environment. Those required to routinely wear a respirator must

be medically assessed to make sure they are capable of withstanding the additional strain on the respiratory and cardiac systems. Asbestos removal operatives, for example, must undergo a medical every two years.

Train to gain

RPE can drastically reduce the potential for harm from hazardous substances, so providing users with the knowledge about how to use it properly will guarantee that it performs as intended. When dealing with asbestos and any other dusts, mists, fumes, vapours and gases, training is a key requirement and should include explaining the hazards, the risks and the effects of exposure. It should also cover how RPE works, why fit testing is important, what maintenance is required and how to clean and store this equipment. In addition,

working with an independent asbestos analysis service provider can ensure that air monitoring data is collected throughout the works to provide evidence of good working practices and adequate control measures, as well as highlighting any concerns or issues during a project. ■

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About SGS

SGS is the world's leading inspection, verification, testing and certification company. SGS is recognized as the global benchmark for quality and integrity. With more than 97,000 employees, SGS operates a network of over 2,600 offices and laboratories around the world.

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