Appendix 6. Selection, Use and Maintenance of Respiratory Protective Equipment (RPE)

1. Introduction

The Control of Substances Hazardous to Health (COSHH) Regulations specify the need to prevent or control exposure to hazardous substances by using a strict hierarchy of control measures.

Where adequate control cannot be achieved by elimination, substitution, engineering or procedural controls alone, then the use of correctly chosen and correctly fitted RPE ***in conjunction with those control measures*** is permissible. Selection of the correct RPE requires an assessment of the properties of the hazardous substances used, consideration of the task, and consideration of the individual wearing it.

This guidance deals only with respirators, which use filters to remove contaminants. The use of breathing apparatus (BA), which has an independent source of breathable air, is considered separately: there are stringent health and fitness requirements for users, who must practice regularly with the equipment.

2. Summary of legal requirements

The law requires RPE to be:

(a) used only where exposure has already been controlled (as far as reasonably practicable) by other means – it is not a substitute for other exposure controls;

(b) adequate[8] and suitable[9] for the task;

(c) UK Conformity Assessed[10];

(d) properly selected, used, and maintained;

(e) correctly stored.

3. Limitations of respirators

Respirators must not be the first line of defence against hazardous material exposures and their use has the following limitations:

(a) RPE must not be used where there is a risk of oxygen deficiency;

(b) RPE is not generally suitable where there is a high concentration of chemical contaminants;

(c) RPE only protects those workers who are wearing it correctly while those who are not wearing it remain unprotected;

---

[8] *Providing the wearer with protection sufficient to comply with legal requirements*

[9] *Matched to the task, the wearer and the wearer's environment*

[10] *STFC requires RPE to be UK Conformity Assessed (UKCA)*

(d) Incorrectly fitted, used or maintained RPE will not provide adequate protection;

(e) RPE may be uncomfortable to wear and may interfere with some work tasks.

4. Permissible uses of respirators

Respirators are suitable:

(a) for controlling residual risks that remain after other controls have been put in place;

(b) for controlling short term or infrequent exposure, where other control measures are not reasonably practicable;

(c) as an interim arrangement, while other controls are being put in place;

(d) for use in emergency situations, where other control measures are not reasonably practicable.

5. Respirator types

Respirators may be divided into two types:

(a) tight fitting (e.g. filtering face-pieces, or half-mask and full-face respirators with filters), which rely on having a good seal with the wearer's face if they are to function optimally;

(b) loose fitting (e.g. powered respirators using hoods, helmets, or visors), which rely on supplying a sufficient flow of clean air from a fan or a fresh air hose to prevent inward leakage of contaminants.

6. Tight fitting respirators

Respirators may be required to control exposure to harmful dusts or aerosols and disposable filtering face-piece dust respirators, or half-mask respirators fitted with particulate filters will be appropriate. These must be tight fitting if they are to provide the protection required.

Where additional protection against chemical exposure is required, users will need half-mask or full-face respirators fitted with appropriate chemical filters. Care should be taken to choose the correct filter, taking advice from manufacturers, suppliers, or the SHE Group, as appropriate.

Further details of different types of tight-fitting respirators and appropriate standards are given in Appendix 1.
All tight-fitting respirators must be worn as described in the manufacturers' instructions (normally supplied with the respirator). Where users require the use of such tight-fitting respirators STFC is legally required to carry out a face fit test to ensure an adequate facial seal for the wearer and thus prove that adequate protection is provided.

7. Face fit testing

Where RPE is being used to control exposure to hazardous substances, STFC requires all users to be face fit tested using either a qualitative method or a quantitative method (using the TSI Portacount™).

In both cases the tightness of the fit is demonstrated by challenging the respirator with an aerosol. In the qualitative test the aerosol contains either saccharine or bitrex particles and any breakthrough will be detected by the wearer as either a sweet or bitter taste, respectively. In the case of the Portacount™ test the instrument measures the relative proportion of particles inside and outside of the respirator.

NOTE: Face fit testing using Portacount™ has an important training benefit, as its real-time mode can be used to show the wearer the result of failing to fit the respirator correctly.

In both cases the fit test confirms that a particular size and type of respirator provides a proper fit, and therefore proper protection, for everyone undergoing the test. Note that the fit test is specific to a particular respirator and changing to a different make, model, size, or filter type (e.g. from FFP2 to FFP3 filters – see Appendix 1) will necessitate another fit test. If more than one type of mask is used, then more than one fit test will be required. A retest will be necessary if there is a significant change to the wearer's facial characteristics, e.g. because of significant weight loss, dental work, or facial injury. Otherwise, fit tests should be undertaken every two years. A record of the tests will be kept for at least five years.

Line managers, with advice from COSHH Assessors or a member of the SHE Group, are responsible for identifying who needs a fit test, for ensuring that they attend for the test and for keeping the records of the fit test itself. Records should be kept for the duration of the individual's employment and a copy should also be provided to the wearer.

NOTE: Those with beards cannot wear any tight-fitting respirator, as they will be unable achieve a satisfactory seal against the face. Similarly, those with facial stubble may not be able to obtain a tight fit. In such cases, the use of loose-fitting respirators may be the only option. See below.

8. Loose fitting respirators

These respirators generally use a battery powered fan unit to supply filtered air via a hood, helmet, or visor at a rate sufficient to avoid contaminants being drawn into the breathing zone. They are suitable for all those who cannot achieve a satisfactory fit with tight fitting respirators, because of facial hair or facial shape (e.g. those with very petite faces). Further details of different types of loose-fitting respirators and appropriate standards are given in Appendix 1. Loose fitting respirators do not require a face fit test.

9. Maintenance and record keeping

Non-disposable respirators must be examined for correct function (e.g. of seals, straps and valves) before use and maintained according to the manufacturers' recommendations. Maintenance may include cleaning, disinfection, examination, repair and testing and should be carried out monthly, although for RPE that is used only occasionally this interval may be extended to three-monthly. Records of maintenance checks must be kept for five years.

10. Storage

Non-disposable RPE should be cleaned after use and all RPE must be stored so that it is protected from adverse conditions (e.g. excessive heat or damaging chemicals). The inside must be kept free of contamination, so it should be stored in a bag (e.g. named zip-lock bag) or box and not simply hung in up a (potentially) contaminated area or left with the inside surface facing up on laboratory or workshop benches where it can become contaminated.

11. Fitness to wear RPE

As well as the requirement for RPE to be correctly fitted to the individual, an adequate level of physical fitness is essential for any individual who may be required to use it. This is because all types of RPE may restrict the wearer to some extent. It can be intrusive equipment, often hot and uncomfortable to wear, particularly for long periods (as it must be worn continuously, until the wearer is away from the contaminated air or environment).

The level of fitness required depends on the type of RPE needed, the type and duration of work being done, and the effort required during its use. Fitness to work with RPE is assessed on an individual basis.

Where the COSHH assessment indicates a specific requirement for RPE, the individual must be referred to SHE Group for a fit test and he or she must complete a simple 'fitness to wear RPE' questionnaire. This is intended to highlight any potential issues where further advice might be required.

Appendix 6.1

RESPIRATOR TYPES AND RESPIRATOR STANDARDS

This appendix concentrates on dust and aerosol filtering respirators as this type is the most likely to be used. Where chemical filtration is required, then suitable disposable half-mask respirators will be needed, or chemical cartridges fitted to half- or full-face masks, or to powered respirators. The appropriate cartridge must be chosen for the contaminant, and this must be changed in line with manufacturers' recommendations.

Generally, a satisfactory (and consistently satisfactory) fit is more likely to be achieved with a half mask respirator than with a disposable respirator and this type is more economical if long term use is needed. If disposable dust respirators are chosen, note that they are generally described as *single shift* respirators – they are designed to be used for a continuous 8-hour shift and should not be used for longer than this.

NOTE: A satisfactory fit is unlikely to be achieved with a disposable respirator that has been donned and removed several times throughout a day.

Three categories of dust filtration are available:

(a) low efficiency, FFPI[11] (Protection Factor[12] 4)

(b) medium efficiency, FFP2 (Protection Factor 10)

(c) high efficiency, FFP3 (Protection Factor 20)

FFP2 and FFP3 respirators are recommended as these give the highest levels of protection.

Disposable respirators may be obtained with or without exhalation valves: those with valves help to avoid heat and moisture build up in the mask and are more comfortable for longer term use.

NOTE: Surgical masks and nuisance dust 'masks', are not classed as RPE: they give no protection against inhalation of fine particulates or vapours and must not be used as a control measure.

[11] *This is a system of classifying respirators into three levels of protection: FFP1, FFP2 and FFP3. Each Filtering Facepiece (FFP) will be categorised and marked according to the level of protection it provides, FFP1 being the 'least' protective and FFP3 being the 'most'.*

[12] *Protection factor(PF): concentration of contaminant in breathing zone = ambient concentration/PF.*

DISPOSABLE DUST RESPIRATORS, WITH OR WITHOUT EXHALATION VALVE

Standard	EN 149:2001 FFP2 or FFP3
Protection	Protection Factors of 10 (FFP2) or 20 (FFP3) are available. Although FFP3 respirators provide significantly better protection than FFP2, they also cost significantly more.
Maintenance	***None required.*** Dispose of them after each shift.
Precautions	Follow the manufacturer's instructions and especially: • check the respirator is in good order before use • use both straps, fitted one below and one above the ears • adjust the nose bridge for a correct fit • do not allow the inside to become contaminated.

Folded disposable respirator with exhalation valve	***Moulded disposable respirator without exhalation valve***	***Moulded disposable respirator with exhalation valve***
		

DISPOSABLE HALF-MASK RESPIRATORS

Standard	EN405
Protection	Factors of 10 (FFP2) or 20 (FFP3) are available in combination with protection against organic vapours and/or inorganic gases. P3 filters provide significantly better protection than P2 filters but at modest increased cost.
Maintenance	***None required.*** These should be disposed of within one month, in which case there are no maintenance requirements under COSHH. Care must be taken over storage if the inside is to remain uncontaminated during their one-month lifetime.
Precautions	Follow the manufacturer's instructions and especially: • check the respirator is in good order before use • wear the straps as indicated by the manufacturer • clean the mask after use – pay special attention to the valve(s) • do not allow the inside to become contaminated • dispose of it after one month of use.

HALF-MASK RESPIRATORS WITH DISPOSABLE FILTERS

Standard	EN 140 (mask). Filter standards are EN 141 (gas filters of Class 1, 2**,** or 3), EN 143 (particle filters of class P1, P2, or P3) and EN 371 (Class Ax, for certain low boiling point organic chemicals)
Protection	For particulate filtration, Protection Factors of 10 (P2) or 20 (P3) are available. EN 143 P3 filters are normally used and excellent face seals may be achieved with this type of mask. Gas filters may be fitted to half-mask respirators, giving protection against organic vapours and/or inorganic gases.
Maintenance	***Required*****.** Under COSHH, non-disposable RPE has stringent maintenance, examination, and test requirements. Unless a commitment can be made to comply with these requirements, the use of non-disposable half-mask respirators is likely to contravene the COSHH Regulations. Because the mask is reused care must be taken over storage if the inside is to remain uncontaminated***.***
Precautions	Follow the manufacturer's instructions and especially: • check the respirator is in good order before use • wear the straps as indicated by the manufacturer • clean the mask after use – pay special attention to the valve(s) • do not allow the inside to become contaminated.

Half mask respirators with various disposable particulate filters

POWERED RESPIRATORS

Standard	EN 12941 TH2 or TH3.They are available with hoods (TH3 or TH2), or visors or helmets (TH2).
Protection	Protection Factors of 20 (TH2) or 40 (TH3). Powered respirators using hoods to EN 12941 TH3 provide the highest level of protection, and respirators to this standard incorporate a low flow warning device.
Maintenance	***Required*.** Under COSHH, examination, testing, and maintenance are required at least monthly. The manufacturer's instructions should be followed, and a record of the tests should be kept for at least five years.
Precautions	Follow the manufacturer's instructions and especially: • check that all parts of the device are in good order before use • check that the fan is providing enough airflow before use • charge or change the battery after use • do not use device if it is dirty, damaged, incomplete or is providing insufficient airflow
NOTE	The use of powered respirators is necessary where individuals cannot wear tight fitting RPE (e.g. they have beards or heavy facial stubble, or a petite facial profile).

Powered respirator with full face piece	**Powered respirator with hood – 'Turbohood'**
	

FULL-FACE RESPIRATORS

Standard	BS EN 136, of Classes 1, 2, or 3 (mask). Filter standards are as described above, to EN 141, 143, or 371
Protection	Protection Factor of 40 when EN 143 P3 filters are used – these filters give excellent protection, the highest standard of face seal may be achieved with this type of mask, and it also protects the eyes. Combination filters may be fitted giving protection against organic vapours and/or inorganic gases. These respirators are cumbersome and uncomfortable to wear and are generally suitable only for use with chemical cartridges in emergencies (e.g. for cleaning up spillages), not for routine protection against dusts.
Maintenance	***Required*.** Under COSHH, non-disposable RPE has stringent maintenance, examination, and test requirements. Unless a commitment can be made to comply with these requirements, the use of full-face respirators is likely to contravene the COSHH Regulations. Care must be taken over storage if the inside is to remain uncontaminated*.*
Precautions	Follow manufacturer's instructions and especially: • check the respirator is in good order before use • wear the straps as indicated by the manufacturer • clean the mask after use – pay special attention to the valves • do not allow the inside to become contaminated.
NOTE	Full face respirators are not suitable for spectacle wearers unless prescription inserts are used in the mask.

Full face respirator with particulate filters	**Full face respirator with gas filtration**	**Full face respirator with combination gas and particulate filtration**
		

Further detailed information on Respiratory Protective Equipment may be found in the HSE's guidance document HSG53 (4th Edition), available at the following link:

https://www.hse.gov.uk/pubns/priced/hsg53.pdf

Appendix 6.2

FILTER TYPES, their USE and LIMITATIONS

Filters are classified according to the form of hazardous substance(s) for which they are appropriate i.e. particulates, gases/vapours, multi-gas mixtures or combined filters i.e. particle and gas or vapour. If the filter is also usable with powered respirators, then they will also be marked 'TH' (turbo hood) for hood devices or 'TM' (turbo mask) for mask devices.

PARTICLE FILTERS	Particle filters are classified according to their efficiency. The filter (or the facepiece it is built into) will be marked with the letter P (for particle) and a number to indicate efficiency, or the level of protection provided: P1 = Low efficiency P2 = Medium efficiency P3 = High efficiency Filters are additionally marked: NR = Not reusable. These filters are intended to be used for a single shift (eight hours) and must be disposed of at the end of the shift. R = Reusable.
Applicability	Particle filters trap and retain particles (such as dust, smoke and micro-organisms) from the air flowing through them. Large particles are easier to trap than small ones. These filters can be used against both solid particles and liquid particles (non-organic mists, fine sprays and aerosols).
Limitations	Particle filters do not absorb gases or vapours or provide protection against oxygen-deficient atmospheres. Particle filters are not effective against organic mists or sprays.
GAS/VAPOUR FILTERS	These filters are designed to remove gases / vapours as specified by the manufacturer. Gas/vapour filters have a standard colour coding and are marked to indicate the substance they are suitable for and their capacity rating.
Applicability	The capacity of these filters is measure of how much of the specified substance can be retained. Class 1 = Low Class 2 = Medium Class 3 = High
Limitations	Gas/vapour filters do not protect against particulates. Gas/vapour filters or do not provide protection against oxygen-deficient atmospheres. Gas/vapour filters have a limited capacity for removing gases/vapours, and after a time the gas or vapour will

breakthrough. When breakthrough occurs, the RPE offers no protection.

The capacity identification on gas/vapour filters is only a guide and not a definitive indicator of when substances are likely to break through.

NOTE Combined filters are available for situations where protection is needed against both particles and specific gases or vapours. This type of filter will carry markings for both particulates and vapours.

MULTI-GAS FILTERS

A multi-gas filter is one that is suitable for more than one type of gas or vapour.

These filters will be marked for the types of gases/vapours for which they are suitable (e.g. A1B2 = Organic vapour filter with capacity class 1 and inorganic gases filter with capacity class 2).

Limitations

Multi-gas filters are more expensive to buy than single type filters and are heavier to wear.

Manufacturer's advice should be followed and further advice sought from SHE Group if combined gas filtration might be required.

FILTER CLASSIFICATION

Filter types				
Colour code	**Type**	**For use against**	**Class**	**Other information**
White	P	Particles	1 2 3	European standard: EN 143
Brown	A	Organic gases and vapours, boiling point above 65 °C	1 2 3	European standard: EN 14387
Grey	B	Inorganic gases and vapours	1 2 3	European standard: EN 14387 Do not use against carbon monoxide
Yellow	E	SO_2 and other acid gases	1 2 3	European standard: EN 14387
Green	K	Ammonia and its organic derivatives	1 2 3	European standard: EN 14387
Red & white	Hg P3	Mercury	–	European standard: EN 14387 Includes P3 particle filter Maximum use time 50 hours No class number
Blue & white	NO P3	Oxides of nitrogen	–	European standard: EN 14387 Includes P3 particle filter Single use only No class number
Brown	AX	Organic gases and vapours, boiling point at or below 65 °C	–	European standard: EN 14387 Single use only No class number
Violet	SX	Substance as specified by the manufacturer	–	European standard: EN 14387