

Respiratory Protective Equipment (RPE) - Selection and use

What is Respiratory Protective Equipment (RPE)

RPE is a particular type of Personal Protective Equipment (PPE) designed to protect the wearer against inhalation of hazardous substances in the workplace air. Typical examples of such substances are:

Solids	Liquids	Gases/vapours
Asbestos dust	Sprayed droplets	Ammonia
Engine exhaust particles	Paints	Carbon monoxide
Lead dust and fume	Pesticides	Carbon dioxide
Silica dust	Power coating mix	Freon's
Welding fume	Liquid jetting	Helium
Shot blasting dust	Sewage water	Nitrogen
Wood dust		Mercury vapour
Smoke	Mists	Solvent vapours
Fungal spores	Chrome acid	Engine exhaust gases
Bacteria	Cutting fluids	
Virus	Oil mist	
Parasites		

RPE is divided into two main types:

- Respirator (filtering device) these use filters to remove contaminants in the workplace air. They should never be used for protection in situations with reduced oxygen levels.
- Breathing apparatus (BA) these need a supply of breathing quality air from an independent source e.g. air cylinder or air compressor.

Breathing apparatus



Respirators / filtering face pieces



Air fed hoods, helmets, visors



Both types of RPE are available with a range of different facepieces, and there are some important differences which will influence your choice of RPE.

Facepieces associated with Breathing apparatus & respirators

These are **tight-fitting** and can be disposable filtering facepieces, filtering facepieces half and full facemasks. They rely on having a good seal with the wearer's face and the wearer will be required to undergo face-fit testing to ensure that a good seal is achieved – see the guidance below

Hoods, helmets, visors

These are **loose-fitting** facepieces which rely on enough clean air being provided to the wearer to prevent contaminant leaking in. They are only used on fan-powered respirators and/or air-fed equipment.

Selecting respiratory protective equipment

You should only use RPE after all other reasonably practicable control measures have been considered. These would typically include:

- Substitution of hazardous substances,
- Changing the physical form or properties of substances to reduce emissions,
- Total enclosure of the process,
- Plant, processes or procedures that minimise the creation of, or suppress or contain the substance (gas, fume, dust etc),
- Partial enclosure with local exhaust ventilation (LEV),
- Good general ventilation,
- Restriction of access, reduce the number of people exposed,
- Reduce exposure time,
- Contamination control, e.g. regular cleaning,
- Safe storage and disposal arrangements,
- Good personal hygiene, i.e. washing facilities; clothes changing and storage; laundering of contaminated clothes; no eating, drinking etc.; eating facilities.

You should consider the use of RPE only where an inhalation exposure risk remains after you have put in place other reasonable controls.

Additionally, RPE may be used where:

- Short-term or infrequent exposures where risk assessment shows that other controls at source are not reasonably practicable,
- While you are putting in place other control measures (interim measures),
- Emergency escape, where you need to provide RPE for safe exit from an area where hazardous substances may be released suddenly in the event of control systems failures,
- Emergency work or temporary failure of controls where other means of controls are not reasonably practicable, for example dealing with a spillage,
- Where emergency rescue by trained personnel is necessary,

Before deciding to select and use RPE, you should ensure that the specific requirements for using RPE are satisfied. Your decision should be justified in a risk assessment; the risk assessment should be recorded.

Further detailed [guidance on working with hazardous substances](#) can be found on the Safety Office web site.

Maintenance of non disposable RPE

Non disposable RPE should be checked for correct functioning before each use. Manufacturer's information specific to the RPE used will tell you how to perform the relevant tests and will typically include; checking for dirty or contaminated equipment, debris preventing valves working, perished valves/components, broken/worn straps or drawstrings, deformed/missing components, seals and o-rings missing, incorrect assembly (e.g. visor inverted), filters incorrect/out of date/missing, DIY modifications, where applicable battery inadequately charged.

Maintenance is a requirement for all RPE, except for single use RPE, and should be carried out by properly trained personnel. Thorough maintenance, examination and tests should be carried out at least once a month. If the RPE is used only occasionally, an examination and test should be made before use and in any event the interval should not exceed three months. Only spare parts from the original manufacturer should be used during maintenance and repair of damaged RPE. Appropriate records should be maintained.

RPE 'face fit' testing

Where 'tight fit' RPE, e.g. breathing apparatus, respirators & filtering facepieces are used it must be fit tested to confirm it provides a tight fit to the wearer's face. If there is not a tight fit, there could be leakage of airborne contaminants which will then be inhaled by the user. Even a slight leak can greatly reduce the protection afforded by the RPE, any facial hair such as beard stubble or moustache, or the wearing of spectacles, in the region where the RPE seals to the face will cause leakage and will result in failure of the fit test.

Available techniques for 'face fit' testing

Qualitative 'face fit' test

Bitter/sweet tasting aerosol fit test method

The person is fit tested while wearing the respirator inside a hood as shown below while the test solution (either bitter or sweet) is sprayed into the hood. If the wearer detects the taste of the aerosol during the test then the fit is unsatisfactory and the fit test is failed. During this test the wearer will carry out a number of specified exercises. Qualitative tests can only be employed for fit testing of filtering facepieces (disposable masks) and half masks but not full face masks. It is anticipated that this 'face fit' technique will be suitable for the majority of applications within the University.



Quantitative 'face fit' test

Particle counting device (TSI™ Portacount Respirator Fit Tester)

These tests can be used to fit test all types of tight-fitting masks including disposable, half and full face masks. Quantitative tests give an objective assessment of facial fit and provide a direct numerical result called a Fit Factor.

A particle counting device counts the number of ambient particles leaking into the face piece and compares this with the particle number challenging the face piece while the wearer carries out a number of specified exercises. This method can either use particles in the ambient air (normal room air contains a significant number of particles which are too small to be seen by the naked eye) or generated aerosols as the test challenge.

TSI™ Portacount Fit Test Operator Training is available as a Full Day course, from a number of national providers at additional cost and is aimed at those who require an in-depth knowledge of Face Fit Testing using the TSI™ PortaCount. It is anticipated that the majority of University staff will not require training in this technique.



Where low volumes of 'face fit' testing is required, a school/department may choose to source the fitting service from either a suitably trained University colleague from another school/department or to use an external service provider with the relevant 'Fit to Fit' accreditation.

University staff and students who undergo face fit testing should have a repeat test if there are significant changes to the shape of the face; for example, if they undergo any substantial dental work or develop facial changes such as scars or moles around the face seal area. Because a 'face fit' is specific to a particular type of breathing apparatus, respirator or filtering face piece, a new 'face fit' will be required if a user needs to use a different type of RPE. Regardless of this, face fit tests should be repeated every 3 years.

As part of the 'face fit' process, wearers of RPE should be instructed in the following:

- Why RPE is needed,
- The protection afforded and the limitations of that protection,
- Why formal face fit testing is required,
- How to wear RPE and check it each time it is used,
- Duration of use for disposable RPE (or single use RPE),
- For reusable RPE:
 - How to clean it,
 - Where to store it,
 - What maintenance is required,
 - What records should be kept,

Face fit testing provision

Face fit testing of 'tight fit' RPE is not optional, HSE guidance recommends it, and there are a number of, reputable companies who can carry out this work for you. However, the University of Nottingham has in place agreements for this as follows:

1. Approved supplier via the 'Safety Consumables' procurement agreement, details available @ http://www.nottingham.ac.uk/procurement/contracts_files/local/contracts.php. This agreement provides for the free, accredited training to a limited number of University staff to enable them to carry out Qualitative 'face fit' testing within their school/department but is limited to the fitting of 3M products only. This will not qualify staff to fit other makes of RPE or to further cascade the training to fellow University colleagues; anyone wishing to carry out 'face fit' testing should

have received the training directly from an authorised provider. Qualitative 'face fit' test kits will be required to carry out this training and subsequent tests, these are available to purchase from a number of reputable providers.

2. Alternatively the University has in place a similar agreement with our Occupational Health Service Provider, details available @ <http://www.nottingham.ac.uk/hr/guidesandsupport/healthandwellbeing/occupational-health/occupational-health.aspx>. This company is also able to offer accredited training for individuals to carry out fit testing, but, for any make of RPE; A half day session will train [6 people], however this is a chargeable service, for current costs check with the Safety Office. The company can provide test kits for training purposes, however, it is recommended that trainees bring their own qualitative 'face fit' test kits to the training session.

The company can also carry out fit testing of individuals, based on half day [12 people] or full day [24 people]. Individual 'one off' fit testing is also available subject to suitable notice being provided.

These sessions would normally be arranged by Schools/departments directly with the company. This would be done by using the Health Surveillance/RPE fit testing management referral form. The company will then provide the referring manager with a schedule for an event and the manager would then populate this with attendee names, a cost code for the service will need to be provided. Alternatively the Safety Office is also able to request training or fit test sessions, recharging attending schools/departments accordingly.

When attending face fit testing, attendees will need to take along the actual RPE used along with other items of face wear e.g. spectacles, goggles, ear defenders etc. they intend to wear alongside the RPE.

Records of all training and 'face fit' testing should be maintained by the school/department.

Further guidance on the selection and use of RPE can be found at <http://www.hse.gov.uk/pubns/priced/hsg53.pdf>.