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RESPIRATORY PROTECTION TRAINING GUIDE


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INTRODUCTION

Potentially harmful substances can enter your body through your respiratory system on worksites where the air contains dusts, mists, fumes, gases and vapours. You may also be exposed to worksites with reduced oxygen levels.

Protect Yourself and Breathe Easy

As part of a respiratory protection program, protecting yourself with the right personal respiratory protective equipment is an essential safety precaution in these work environments.

What Is Respiratory Protective Equipment (RPE)?

Personal respiratory protective equipment (RPE) is designed to prevent the inhalation of contaminated air. There are different types of RPE designed to offer protection from different types of contaminants.

For maximum protective effect, it is important to:

- Select the most appropriate equipment for the type of airborne substance
- Use it correctly
- Maintain it correctly

Australian Standards for Respiratory Protection

There are two Australian/New Zealand Standards covering personal respiratory protection and risk management. These Standards form a basis for the selection, use and maintenance of RPE in Australian and New Zealand workplaces.

AS/NZS 1715:2009 Selection, use and maintenance of respiratory protective equipment.

This Standard offers information to employers and users on different types of RPE, how to select the right type for the job and how to correctly maintain it.

AS/NZS 1716:2012 Respiratory protective devices.

This Standard offers information to manufacturers, suppliers, employers and users by setting out performance requirements for different types of RPE.

CLASSIFICATION OF RESPIRATORY HAZARDS

Understanding the types of respiratory hazards you may encounter on a worksite is the first step in properly managing them.
Hazards requiring RPE may be classified as follows:

- Deficiency of oxygen
- Particulate contaminants
- Gaseous or vapour contaminants

Australian Standard AS/NZS 1715:2009 classifies contaminated air into the following types:

Particles:

Dusts/Fibres – Solid particles generated by mechanical means such as crushing, cutting and sanding.
Examples are calcium carbonate, cement (silica) dust, sulphur, glass-wool, coal, clay, cellulose, cotton dust, flour, ferrous metals (steel, stainless steel, cast iron), wood dust and asbestos.

Mists – Airborne droplets of liquid suspended in air. They are usually formed by condensation of vapour back to a liquid state or by breaking up as a liquid into a dispersed state such as by splashing, spraying or atomising.
Examples are oil mist produced during cutting and grinding operations, acid mists from electroplating, acid and alkali mists from pickling operations, the condensation of water vapour to form a fog and paint mist.

Fumes – Fine particles, usually less than 1.0µm in diameter, formed from a volatilised solid that has condensed in cool air. In most cases the hot vapour reacts with air to form an oxide. Fume is often associated with molten metals especially in processes such as welding.
Examples are welding, soldering, brazing and bushfire smoke.

Gases:

Gases are formless fluids that expand to occupy the space or enclosure in which they are confined.
Examples are nitrogen, oxygen and carbon dioxide and carbon monoxide.

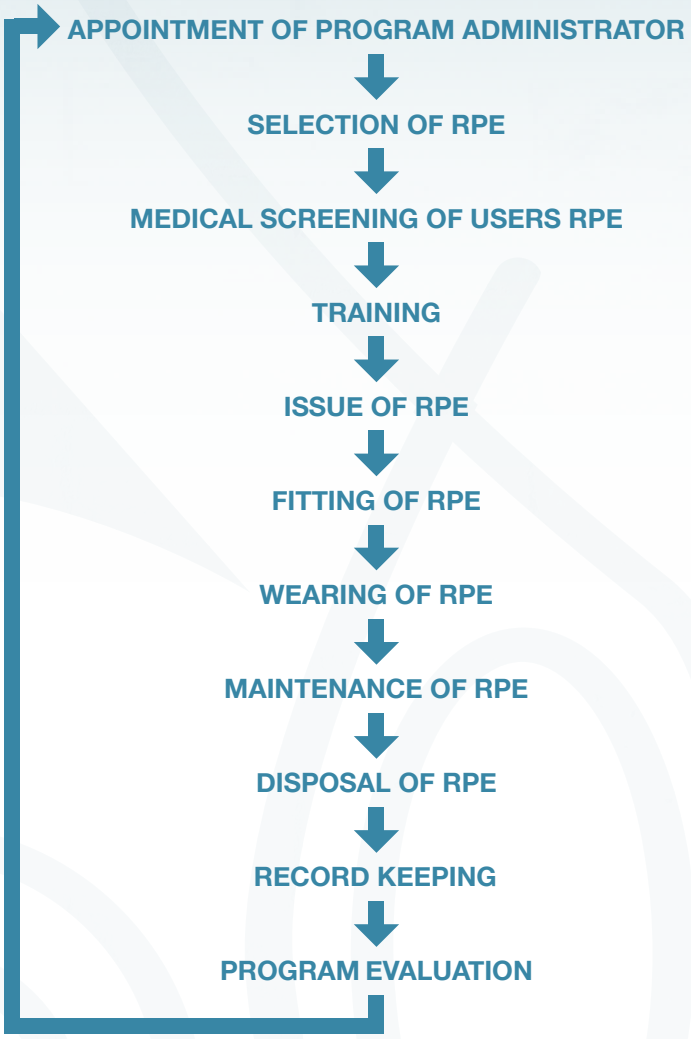
Vapour:

Vapour is the gaseous form of a substance which is normally in the solid or liquid state at room temperature and pressure.
Examples are methylene chloride, toluene and mineral spirits.

ESTABLISHING A RESPIRATORY PROTECTION PROGRAM

It is best practice to manage RPE in the context of a comprehensive respiratory protection program. AS/NZS 1715:2009 states that where RPE is required to be worn, a respiratory protection program must be established.

You should establish procedures in relation to the following:



SELECTING THE RIGHT RPE

Selecting the right type of RPE for the job is crucial for effective respiratory protection. According to AS/NZS 1715:2009, your selection process should consider the following:

- Conformance with the requirements of AS/NZS 1716:2009
- Medical evaluation of wearers for psychological and physical suitability
- Contaminant factors including toxicity, exposure standards, skin absorption, etc.
- Task factors including mobility, harsh environments, etc.
- Operator factors including comfort, other PPE, vision, communication, etc.

Types of Respiratory Protective Devices

There are two main types of respiratory protective devices:

- Air purifying devices
- Devices that supply air

Factors in the Selection of RPE Devices

Many factors need to be considered when selecting a suitable respirator for a particular situation. It is important to ensure that only RPE complying with AS/NZS 1716:2012 be used and, where there is any doubt, expert occupational hygiene advice should be sought. To protect effectively, the RPE needs to be worn whenever the person is exposed to excessive levels of the contaminant.

The selection of RPE will be influenced by the following factors:

A. Contaminant
B. Task
C. Operator
D. Equipment limitations

A. Factors in the Selection of RPE Devices: Contaminant

When selecting the most appropriate RPE, begin by identifying the nature of the contaminant you are dealing with. First and foremost, the respirator needs to have capabilities against the physical form of the contaminant. Particulates require a filter web while gases and vapours require sorbents to "soak" up the contaminant. Depending on their properties, different gases and vapours need different sorbents. Within AS/NZS 1715:2009 there are different classes of gas and vapour filters:

P: Particulates
A: Organic vapours
B: Acid gases
E: Inorganic gases
K: Ammonia
OTHERS: there are other type-specific filters available

Checklist

Check the following before recommending filtering respiratory protection:

- Is there enough oxygen in the ambient air? Minimum of 18% required.
- What contaminants are in the ambient air?
- What are the concentrations of the contaminants?
- Are the contaminants in particle, vapour or gas form? Or are they a mixture?
- Do the contaminants have adequate warning properties (e.g. smell or taste?)
- What are the applicable occupational exposure limits (OEL)?
- In addition to respiratory protection, is other PPE (e.g. eye or ear protection) required?

Tip

Use this link to find out the OEL for chemicals:
http://hcis.safeworkaustralia.gov.au/ExposureStandards

SELECTING THE RIGHT RPE

A. Factors in the Selection of RPE Devices: Contaminant (Continued)

Factors and Exposure Standards

The reduction in exposure that a respirator can provide is dependent on the level of contaminant in the environment and the type of respirator.

The required minimum protection factor is the factor necessary to reduce the exposure of the wearer to a level below the exposure standard or to minimise exposure to an accepted level.
It is expressed by the equation:

$$\text{Required Minimum Protection Factor} = \frac{\text{Ambient Airborne Concentration}}{\text{Acceptable Exposure Level/Standard}}$$

Particulate Example: Determining the Needed Protection Factor of Your Respirator

The MPF is the minimum protection factor.

- Contaminant: lead dust (particle protection is needed)
- Concentration at the workplace: 3mg/m3
- OEL (occupational exposure limit): 0.05mg/m3
- Doing the maths: 3mg/0.05mg = 60 MPF
- Suitable protection: P3 full face respirator
- Minimum protection factor = $\frac{\text{Concentration of hazardous substance}}{\text{OEL}}$

Gas/Vapour Example : Determining the Needed Protection Factor of Your Respirator

The MPF is the minimum protection factor.

- Contaminant: MEK (methyl ethyl ketone)
- Concentration at the workplace: 300ppm
- OEL (occupational exposure limit): 150ppm
- Doing the maths – 300ppm/150ppm = 2 MPF
- Filter Type A – organic vapour
- Suitable protection: PCA1P2
- Minimum protection factor = $\frac{\text{Concentration of hazardous substance}}{\text{OEL}}$

Contaminant: Mechanically Generated Particulates

Required minimum protection factor	Suitable RPE
Up to 10	P1, P2 or P3 filter half facepiece - replaceable filter P1 or P2 disposable facepiece PAPR* - P1 filter in PAPR with any head covering or facepiece
Up to 50	P2 filter in full facepiece PAPR - P2 filter in PAPR with any head covering or full facepiece PAPR - P3 filter in PAPR with any head covering Half facepiece with positive pressure demand or continuous flow air-line Half facepiece - air-hose RPE with electric blower
Up to 100	P3 filter in full facepiece Full facepiece air-hose (hose mask) natural breathing type
100+	PAPR-P3 filter in PAPR with full facepiece or head covering and blouse Head covering air-hose with electric blower Head covering air-line respirator - continous flow Full facepiece air-line respirator - positive pressure demand or continous flow modes Full facepiece air-hose with electric blower

*PAPR - Powered Air-Purifying Respirator

Contaminant: Thermally Generated Particulates

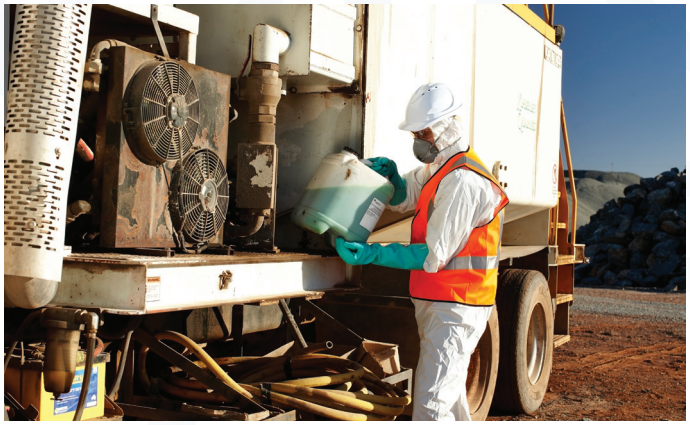
Required minimum protection factor	Suitable RPE
Up to 10	P2 or P3 filter half facepiece - replaceable filter P2 disposable facepiece
Up to 50	P2 filter in full facepiece PAPR* - P2 filter in PAPR with any head covering or full facepiece PAPR - P3 filter in PAPR with any head covering or full facepiece Half facepiece with positive pressure demand or continuous flow air-line Half facepiece - air-hose with electric blower
Up to 100	P3 filter in full facepiece Full facepiece air-hose (hose mask) natural breathing type
100+	PAPR-P3 filter in PAPR with full facepiece or head covering and blouse Head covering air-hose with electric blower Head covering air-line respirator - continous flow Full facepiece air-line respirator - positive pressure demand or continous flow modes Full facepiece air-hose with electric blower

*PAPR - Powered Air-Purifying Respirator

Contaminant: Gas and Vapour Concentration

Required minimum protection factor	Maximum gas/vapour concentration present in air p.p.m. (by volume)	Suitable RPE
Up to 10	1 000	Class AUS, 1, 2 or 3 filter with half facepiece - replaceable filter or disposable facepiece Class PAPR*-AUS, PAPR-1 or PAPR-2 filters in PAPR with any head covering or facepiece
Up to 50	1 000	Class AUS or Class 1 filter with full facepiece
Up to 50	5 000	Half facepiece air-line respirator with positive demand - or continuous flow Half facepiece air-hose with electric blower
Up to 100	5 000	Class 2 filter with full facepiece Class PAPR-2 filters, with full facepiece PAPR
Up to 100	10 000	Class 3 filter with full facepiece Full facepiece air-line respirator - negative pressure demand SCBA negative pressure demand Full facepiece air-hose (hose mask) natural breathing type
100+		Full facepiece, head covering or air-supplied suit with air-line respirator - positive pressure demand or continous flow SCBA positive pressure demand Full facepiece air-hose with electric blower

*PAPR - Powered Air-Purifying Respirator



ENSURING THE EQUIPMENT AND FILTERS CONFORM TO THE STANDARDS

B. Factors in the Selection of RPE Devices: Task

When selecting your RPE, you also need to consider the nature of the task. Respirator selection factors that relate to the task are:

- Whether the respirator will be used on a regular basis (i.e. day to day) or only for emergency purposes. Where regular use is expected, comfort and convenience will be a significant factor. The extended use of negative pressure respirators will impose some discomfort and where particulates are involved a gradual increase in breathing resistance will be detected.
- Where strenuous activity is required, the physiological load imposed by negative pressure may decrease the performance of wearers. The degree of mobility may restrict the use of airline or air hose.
- Any restrictions on vision need to be considered, particularly in tasks that require good peripheral vision. Where the task requires good clear communication with others, the characteristics of the respiratory protection can assume considerable importance.
- The availability, organisational arrangements and resources to maintain respiratory protective devices also need to be considered.

C. Factors in the Selection of RPE Devices: Operator

When selecting your RPE, the effect on the user and their characteristics should be investigated.

- Wearing respirators in hot environments or when undertaking strenuous work imposes considerable physiological load on wearers. The ability of the wearer to cope with this load needs to be taken into account.
- Facial fit is a prime factor in obtaining good respiratory protection when using half or full face respirators. Facial hair around the cheeks, neck and jaw will impair the ability of respirators to seal and permit inward leakage of the atmosphere into the respirator.
- Users must be confident in the ability of the respirator they are wearing to protect them and it must be comfortable, not obstructing to their field of vision and not impeding their ability to communicate when needed. If users are not accepting of the respirator, then it will not be worn, increasing risk of exposure.

D. Factors in the Selection of RPE Devices: Equipment Limitations

RPE should be viewed as only one strategy in a complete respiratory protection program. It is important to be aware that RPE does not control a hazard at source and cannot be a substitute for strategies higher in the hierarchy of control. These may include eliminating or reducing harmful airborne contaminants, increasing ventilation and modifying work methods.

Make sure each RPE device you select conforms with the required Standard, especially in relation to the appropriate class of filter. Look for Australian Standard markings on the RPE or its packaging – AS/NZS 1716:2012 Respiratory protective devices.

Classification of Filters

A. Particulate Filters

Particulate (dust, mist, smoke and fume) filters are classified according to their ability to filter a test cloud of particles with a size distribution as defined in AS/NZS 1716:2012.

- **Class P1 filters**
  P1 filters are used against mechanically generated particulates, e.g. silica and chrysotile. Three types of Class P1 filter RPE are generally available – the powered type, replaceable filter type and disposable type.
- **Class P2 filters**
  P2 filters are used for protection against mechanically or thermally generated particulates or both, e.g. metal fumes. Three types of Class P2 RPE are generally available, the powered type, replaceable filter type and disposable type.
- **Class P3 filters**
  These are used for protection against highly toxic or highly irritant particulates, such as beryllium. Two types of Class P3 RPE are generally available – the powered type and replaceable filter type. For P3 filter classification, a full facepiece is required for non-powered RPE, but either a head covering or full facepiece for a PAPR. When a P3 filter is used in a half facepiece, a protection factor equivalent to a P2 filter is achieved due to facial fit being potentially compromised.

Filter class refers to the capacity of the filter as outlined in this table:

Classification	Efficiency	Application
P1	80% (particles to 1µm micron = 0.001mm size)	Dusts
P2	94% (particles to 0.3µm micron = 0.0003mm size)	Toxic dusts including asbestos, welding fumes
P3	99.95% (particles to <0.3µm micron = less than 0.0003mm size)	Toxic dusts including asbestos, welding fumes, full face and powered air performance at P3 only

When sealed to a suitable former and tested, non-powered respirator filters should not show penetration in excess of the following:

- Class P1 – not more than 20%
- Class P2 – not more than 6%
- Class P3 – not more than 0.05%

ENSURING THE EQUIPMENT AND FILTERS CONFORM TO THE STANDARDS

B. Gas Filters

The different types of filters are specified in the table and AS/NZS 1716:2012. The classes are distinguished by their gas absorptive capacity and, in general, by their size and mass. (See table.)

Filters are classified in one of the following:

- Class AUS – low absorption capacity filters
- Class 1 – low to medium absorption capacity filters
- Class 2 – medium absorption capacity filters
- Class 3 – high absorption capacity filters

Class AUS and Class 1, the lowest capacity filters, are generally combined with a half facepiece, the limiting factor of which is the adequacy of facial seal, gas capacity or lack of eye protection. Where contaminants are present in high concentrations which may cause adverse reactions or which may be allergenic, even in low exposures, half facepiece RPE may not provide an adequate facial seal.

Filter type	Description name	Examples of contaminants/uses
A (All clases)	Organic vapours	Solvents (with boiling point above 65°C)
B AUS or B1	Acid gases	Chlorine/sterilization of water; chemical manufacture; hydrogen chloride/ chlorinated organic chemical manufacture; steel pickling
B2	Acid gas and hydrogen cyanide (HCN)	Plastics manufacture; gold ore refining
B3	Acid gas and hydrogen cyanide (HCN)	HCN fumigation
E	Sulfur dioxide (SO_2)	SO_2 /casting of metals; bleach manufacture; manufacture of sulfuric acid; fertiliser manufacture; metal cleaning; petroleum refining
G	Agriculture chemicals	Low vapour pressure (below 1.3Pa at 25°C) organic vapours, pesticide spraying, mixing, manufacture
K	Ammonia (NH_3)	NH_3/refrigeration; manufacture of fertilisers, explosives, plastics; low boiling point amines/chemical manufacture
Hg	Mercury	Metallic mercury/chemical industry; inorganic mercury compounds
NO	Oxides of nitrogen	Oxides of nitrogen
MB	Methyl bromide	Fumigation
AX	Low boiling point organic compounds (below 65°C)	As specified by the manufacturer, e.g. dimethyl ether, vinyl chloride
Specific chemical type	Specific chemical name	For use against specific chemicals not falling in the above type description as specified by the manufacturer, e.g. hydrogen fluoride

ENSURING PROPER FIT

Making sure your RPE is properly fitted and tested is one of the most important responsibilities of a respiratory protection program.

If your RPE does not make a tight seal around your face when you inhale, you may breathe in contaminants that have leaked in around the edges and risk exposure to unsafe levels of contaminants.

Mandatory Facial Fit Tests

Carrying out facial fit testing within your respiratory protection program is mandated under the Australian Standard. The objective is to ensure the RPE fits properly and forms an effective seal.

AS/NZS 1715:2009 states: “The program administrator shall ensure a suitable fit test is carried out for all users of respiratory protective equipment (RPE) with a close fitting facepiece.”

Frequency of Facial Fit Tests

Facial fit tests should be performed at appropriate intervals, particularly when there is a change in the wearer’s facial characteristics, e.g. loss of teeth or excessive changes in weight, or where biological tests, e.g. lead in blood, indicate excessive exposure to a contaminant.

The following steps of facial fit testing should be incorporated into the respiratory protection program:

- Before the respirator is issued, a qualitative or quantitative fit test should be performed to assure the choice of a suitable respirator.
- A further facial fit test should be performed at least annually or whenever there is a change in the wearer’s facial characteristics or other features, which may affect the facial seal of the respirator.
- At each use, the respirator should be put on before entering the contaminated area so the user can perform a simple positive or negative pressure fit check to test the respirator fit.

Facial Hair

Facial hair can affect the seal of the RPE against the wearer’s skin. Beards, moustaches and sideburns prevent satisfactory sealing.

The reduction in pressure of these respirators during inhalation may lead to leakage of contaminant into the facepiece where there is a poor seal. Therefore, individuals who have stubble (even a few days’ growth will cause excessive leakage of contaminant), a moustache, sideburns or a beard that passes between the skin and the sealing surface should not wear a respirator that requires a facial seal.

MAINTAINING AND STORING YOUR RPE

Fit Test Methods

There are two types of test – qualitative and quantitative. The use of one or both types of test depends on the type of RPE to be fit tested, the extent of RPE usage and the available resources of trained personnel and capital.

- **Qualitative Fit Testing**
  A qualitative fit test is a pass/fail test that relies on the wearer's response to a test agent. Protocols include saccharin, isoamyl acetate (banana oil), Bitrex and irritant smoke.
- **Quantitative Fit Testing**
  A quantitative fit test measures the adequacy of a respirator's fit by numerically measuring the amount of leakage into the respirator. This can be completed via the use of a PortaCount.

The PortaCount works by measuring the concentration of microscopic dust particles in the ambient air and then measuring the concentration of those dust particles that leak into the respirator. The ratio of these two concentrations is called the fit factor. The filters essentially stop all the particles so anything that gets into the mask must have come through the face seal.

A quantitative fit test is not affected by the person's sense of smell, taste or sensitivity to irritant chemicals.

Facial Fit Checks

Fit checks must be conducted before each use as a guide to ensure the RPE is fitted correctly.

- **Negative Pressure Fit Check**
  The wearer closes off inhalation through the filter or filters either by covering the intake or by squeezing the breathing tube so that it does not pass air, inhales gently so that the facepiece collapses slightly, and holds their breath for about 10 seconds. If the facepiece remains slightly collapsed and no inward leakage is detected, the RPE is probably well fitted.

- **Positive Pressure Fit Check**
  The wearer closes off the exhalation valve and exhales gently into the facepiece. The fit is considered satisfactory if slight positive pressure can be built up inside the facepiece without any evidence of outward leakage.

  For some RPE, this check may require the wearer to remove the exhalation valve cover which often disturbs the fit even more than the negative pressure test. Therefore, this test should be used sparingly if it requires removing and replacing a valve cover. The test is easy for facepieces that have a valve cover with a single small port that can be closed by the palm or a finger.

A systematic approach to the maintenance and storage of RPE is essential to ensure it keeps performing and protecting the wearer as it should.

A maintenance and storage system may include regular inspections, testing, cleaning, disinfecting, repair, replacement and appropriate storage.

Regular Inspections and Maintenance

Checklist for Defects:

Inspection	Maintenance action
Disposable RPE	
Physical damage (e.g. holes) to filter	Obtain new RPE
Straps for elasticity and deterioration	Obtain new RPE
Metal nose clip for deterioration	Obtain new RPE
Air-purifying RPE (re-usable full/half facepiece	
Facepiece:	
Dirt	Clean all dirt from the facepiece
Cracks, tears, holes, hardening or tackiness	Obtain a new facepiece
Cracked, scratched, or loose fitting lenses	Contact manufacturer to see if a replacement is possible; otherwise obtain a new facepiece
Distortion	Allow facepiece to 'sit' free from any constraints and see if distortion disappears; if not, obtain a new facepiece
Head Straps:	
Breaks or tears	Replace head harness
Loss of elasticity	Replace head harness
Broken or malfunctioning buckles or attatchments	Obtain new parts or replace head harness
Excessively worn serrations on head harness which may cause facepiece to slip	Replace head harness
Inhalation and Exhalation Valves:	
Detergent residue, dust particles, or dirt on valve or valve seat	Clean residue with soap and water and rinse thoroughly
Cracks, tears, or distortion in the valve material or valve seat	Contact manufacturer for instructions
Missing or defective valve cover	Obtain new valve cover
Filter Elements:	
Increased filter resistance	Replace filter
Missing or worn gaskets	Replace gasket
Worn filter and facepiece connections	Replace filter or facepiece, as applicable
Cracks or dents in filter housing	Replace filter
Deterioration of gas filter support harness	Replace the harness
Service life indicator or end of service date	Replace filter
Clogged pre-filter	Replace pre-filter to extend life of main filter
Breathing Tube:	
Hardening, cracks or holes	Replace tube
Missing or loose hose clamps	Obtain new clamps
Broken or missing end connectors	Obtain new connectors

MAINTAINING AND STORING YOUR RPE

Replacement of Filters

There is no overall rule about when filters should be changed. Each situation needs to be treated individually.

Advice should be sought from the manufacturer of the RPE in conjunction with an OHS professional, e.g. an occupational hygienist, on an acceptable change-over time based on likely exposure patterns so an adequate safety margin is allowed. Based on this advice a filter replacement schedule shall be established and documented.

Particulate Filter Life Cycle

The breathing resistance of the filter will progressively increase in use as it becomes clogged with trapped particles. Eventually breathing resistance becomes so high that the filter must be replaced. The time this takes will vary according to the characteristics of the filter, and the type, size and concentration of the particles.

The use of a pre-filter is advantageous where coarse particulates would otherwise rapidly clog the filter.

The use of back flushing or other methods such as compressed air blowing to prolong the life of a particulate filter should be actively discouraged since it will reduce the efficiency of the filter.

Gas Filter Life Cycle

The life of a filter is difficult to assess under normal working conditions, being dependent on the concentration of contaminant in the atmosphere, the humidity and the work rate of the wearer.

Filter change schedules should be established. All classes of gas filter should be discarded no longer than six months after opening, irrespective of the number of periods of use.

Cleaning and Disinfecting Your RPE

- Remove filters from facepiece where applicable.
- Disassemble facepieces according to manufacturer's instructions.
- Replace or repair any defective parts.
- Wash components in warm (40°C maximum) water with a mild detergent or with cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to remove dirt.
- Rinse components thoroughly in clean, warm (40°C maximum), preferably running, water. Drain and allow to air dry.
- When the cleaner used does not contain a disinfecting agent, and disinfection is required, respirator components should be immersed for about two minutes in one of the following:
  - Hypochlorite solution (50ppm of chlorine) made by adding approximately 2mL of laundry bleach to one litre of water at a temperature not greater than 40°C.
  - Aqueous solution of iodine (50ppm iodine) made by adding approximately 0.8mL of tincture of iodine (6–8 grams ammonium and/or potassium iodide/100mL of 40% alcohol (v/v) to one litre of water at a temperature not greater than 40°C.
  - Other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer. Resuscitators and medical masks should be cleaned by other methods. Check for most up-to-date information.
- After disinfection, rinse components thoroughly in clean water, drain and allow to air dry.
- Reassemble the facepiece in accordance with the manufacturer's instructions and store.

Storing Your RPE

Users should consult manufacturer's instructions. The following should be observed for storage and protection:

- RPE should be readily available to encourage use.
- RPE should be kept clean and dry and away from dust, corrosive atmospheres, oil and exposure to direct sunlight to avoid deterioration in airtight container.
- Facepieces should be stored so that they are not subject to distortion.

COMMON TERMS

Aerosol
A suspension of fine solid or liquid particles in a gas, e.g. smoke, fog or mist.

Air-purifying respirator
A device that filters contaminants from inhaled air.

Atmospheric contaminant
Any substance, either gaseous or particulate, that is not a constituent of the normal atmosphere, or that is present in a concentration greater than that found in the normal atmosphere.

Combination filter respirator
A device combining the filtration capabilities of gas or vapour and particulate filters. The filters may be a single unit (integral) or consist of separate filters in series to form one unit (combination).

Disposable respirator
A respiratory protective device for which maintenance is not intended and which is designed to be discarded after excessive resistance, sorbent exhaustion, physical damage or end of service life renders it unsuitable for use.

Dusts
Solid particles generated and dispersed into the air by, for example, handling, crushing or grinding of organic or inorganic materials such as rock, ore, coal, wood and grain.

Equivalent aerodynamic diameter (EAD)
The diameter of a spherical particle of unit density (1g/cm3) which exhibits the same aerodynamic behaviour as the particle in question.

Exposure standard
An exposure standard as defined by NOHSC (Safe Work Australia) represents an airborne concentration of a particular substance in the worker's breathing zone, exposure to which, according to current knowledge, should not cause adverse health effects nor cause undue discomfort to nearly all workers. The exposure standard can be of three forms: peak limitation, time-weighted average (TWA) or short term exposure limit (STEL) – see NOHSC 3008.

Exposure standard – peak limitation
A maximum or peak airborne concentration of a particular substance determined over the shortest analytically practicable period of time which does not exceed 15 minutes.

Exposure standard – short term exposure limit (STEL)
A 15 minute TWA exposure which should not be exceeded at any time during a working day even if the eight-hour TWA average is within the TWA exposure standard. Exposure at the STEL should not be longer than 15 minutes and should not be repeated more than four times per day. There should be at least 60 minutes between successive exposures at the STEL.

Exposure standard – time-weighted average (TWA)
The average airborne concentration of a particular substance when calculated over a normal eight-hour working day, for a five-day working week.

Facial fit check
A simple check to ensure the respirator fits each time it is worn.

Facial fit test
A validated method of matching a respirator to an individual.

Full facepiece
A close fitting device to cover the eyes, nose and mouth and be secured in position by suitable means.

Fume
Extremely fine particles, usually less than 1.0µm in diameter, formed from a volatilised solid that has condensed in cool air. In most cases the hot vapour reacts with air to form an oxide. Fume is often associated with molten metals, especially in processes such as welding. At high fume concentrations, agglomeration of particles may result in particles with much larger dimensions.

Gases
Formless fluids that expand to occupy the space or enclosure in which they are confined. Examples are nitrogen, oxygen and carbon dioxide.

Gas filter respirator
A device consisting of a half facepiece, full facepiece, head covering or mouthpiece with a filter that removes certain gases or vapours from the air to be inhaled by the wearer for a limited period of time. It may also incorporate a filter to remove particulates.

Half facepiece
A close fitting device to cover the nose, mouth and chin and be secured in position by suitable means.

Immediately dangerous to life and health (IDLH)
A situation that poses a threat of exposure to airborne contaminants when that exposure is likely to cause death or immediate permanent adverse effects on health or prevent escape from such an environment.

Material safety data sheet (MSDS)
A detailed information bulletin prepared by the manufacturer or importer of a chemical that describes its physical, environmental and chemical properties, health hazards, routes of exposure, precautions for safe handling and use, emergency and first aid procedures, and control measures.

Micro-organism
Any microscopic entity capable of carrying on living processes. Examples include protozoa, fungi, bacteria and viruses.

Minimum protection factor (MPF)
The level of respiratory protection that an item of properly functioning respiratory protective equipment (RPE) or class of RPE would be expected to provide to properly fitted and trained users in the workplace when used in accordance with the manufacturer's information and instructions. The MPF takes into account all expected sources of facepiece penetration (e.g. face seal protection, valve leakage).

COMMON TERMS

Mists
Mists are suspended liquid droplets generated by condensation of vapour back to liquid state or by breaking up as a liquid into a dispersed state such as by splashing, spraying or atomising. Mist is the term applied to a finely divided liquid suspended in the atmosphere. Examples are an oil mist produced during cutting and grinding operations, acid mists from electroplating, acid and alkali mists from pickling operations and the condensation of water vapour to form a fog.

Nuisance dust mask
A lightweight mask that does not meet the requirements of AS/NZS 1716:2012 with a filter intended only for extremely coarse non-toxic particulates. These masks do not give protection against gases or vapours.

Particles
A generic term used to describe airborne solid or liquid substances in the finely divided state, i.e. particulate aerosols, such as dusts, mists, fumes, fibres, and fog as well as micro-organisms.

Particulate filter respirator
A device consisting of a half facepiece, full facepiece or head covering with particulate filter which removes finely divided solids or liquid matter from the air to be inhaled by the wearer. The filter medium may be replaceable or be an integral part of the construction.

Powered air-purifying respirator (PAPR)
A device incorporating a half facepiece, full facepiece or head covering which provides the wearer with air filtered through a powered filtering unit, comprising a filter or filters, and an electrically operated blower unit. The respirator is referred to as a PAPR.

Protection factor
A measure of the degree of protection afforded by the respirator, defined as the ratio of the concentration of contaminant outside the respirator to that inside the respirator.

Qualitative fit test
A facial fit test giving pass/fail results and relying on the subject's response to a test agent.

Quantitative fit test
A facial fit test giving numerical results and not relying on the subject's response to a test agent. Usually conducted by an occupational hygienist.

Required minimum protection factor
The protection factor required to reduce exposure to an accepted level. It is expressed as a ratio of the measured ambient airborne concentration of a contaminant to an acceptable exposure level or standard.

Self-contained breathing apparatus (SCBA)
A portable respirator that supplies oxygen, air or other respirable gas from a source carried by the user.

Smoke
Smoke consists of carbon or soot particles or tarry droplets less than 0.1µm in size and suspended in air, which results from the incomplete combustion of carbonaceous materials such as wood, coal, oil or paper.
Note: Normally, the combustion process producing smoke also produces gases.

Supplied air RPE
A device that supplies air to the wearer from a source other than the ambient atmosphere.

Supplied oxygen RPE
A device that supplies oxygen from a source of liquid or compressed oxygen carried by the wearer.

Thermally generated particulates
See "fume" and "smoke".

Vapour
Vapour is the gaseous form of a substance which is normally in the solid or liquid state at room temperature and pressure.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