*This document is under review, if you have any input, please email safety@unsw.edu.au.

HS659 Personal Protective Equipment Guideline

Introduction

Selection of suitable Personal Protective Equipment (PPE) is to be based on the completion of a risk management form and the risks controlled by following the Hierarchy of Risk Controls methodology. Higher order risk control measures (elimination, substitution, and engineering controls) should always be considered before relying exclusively on PPE. Faculties may specify the use of particular PPE matched to unique hazards or situations. Requirements for the use and maintenance of specialised PPE are to be set out in documented work procedures.

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1. Scope

UNSW requires all staff, students, and visitors to document a risk management plan for their activities in laboratories, workshops, plant rooms, makerspaces, construction sites and preparing for field trips, Where risks cannot be completely eliminated or controlled by higher order risk control measures, then PPE must be used.

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PPE refers to clothing or equipment that provides a physical barrier protecting a user and a hazard. High visibility clothing whilst not providing a physical barrier, provides an increased sighting distance by improving the visibility of the wearer to vehicle and plant drivers and operators.

PPE includes:

- protective clothing
- head protection
- protective eyewear
- hearing protection
- high visibility clothing
- respiratory protection
- protective footwear
- adverse weather gear
- hand protection
- sun protection
- additional or specialised PPE, e.g., respirators.

All possible routes of entry of the hazard into the body must be taken into account when considering the PPE to be used.

2. General requirements for correct use of PPE

2.1 Signage

Mandatory PPE signage is to be displayed at the entrance to the facility denotes what PPE must be worn at all times whilst within. This is documented on an entrance door signage poster using How to make your own Safety Hazard Poster

Where additional PPE is expected to be worn inside a facility, there should be appropriate PPE signage in close proximity to these locations.

Where PPE is stored out of sight within the laboratory there should be clear signage highlighting the storage location.

The WHS guide, PPE Signs can use to help achieve this.

2.2 Issuing PPE

Supervisors are to make sure UNSW workers, research students (including Honours students) visitors, and where required, contractors are to be issued with PPE when required. The only exception applies to research students, where the provision of safety, protective or occupational footwear is their responsibility.

Undergraduate students are required to provide their own PPE, such as laboratory coats and protective eyewear, as required by the particular course.

Re-usable PPE that comes into contact with the skin is to be issued on a personal basis. Other types of PPE which do not come into skin contact but are required to undertake a core function of the position should also be issued on a personal basis.

Re-usable items of PPE which cannot be cleaned to an unsoiled state are to be discarded.

PPE for issue to visitors is to be disposable wherever practicable. Where this is not practicable, non-disposable PPE may be used for the duration of the visit and cleaned in accordance with the recommendation of the manufacturer/supplier before reuse.

2.3 Fitting

The correct fit is a prerequisite for the correct operation of PPE and must be checked before the PPE is used. This is especially important for respiratory devices where a good facial seal is required.

2.4 Instruction and training

Staff, students, and visitors must be taught the correct way to use the PPE. Instruction should include the need for the equipment, its basic design principles, its application, and limitations.

PPE requirements are to be incorporated into inductions (for staff, contractors, and visitors).

Persons performing work that requires PPE are to be competent in those activities and the selection, fitting, use and maintenance of the required PPE. They are also to understand any additional risks the PPE may introduce and the compensating controls in place at the workplace. For example, the use of hearing protection may limit the person's ability to hear audible warning signals so visual signals are also provided.

2.5 Maintenance

All PPE must be maintained, tested, and stored according to the manufacturer's requirements. The PPE must be kept in a clean, hygienic, and effective condition. Cleaning products should be those recommended by the manufacturer and should be readily available at the location where the PPE is used and/or stored. PPE should be cleaned after use and before placing back into storage. Where a problem has been noticed by the user, the problem should be reported and rectified before the PPE is to be re-used.

When not in use, PPE should be stored in a convenient, accessible, and appropriate manner. Some PPE, such as re-usable respirators, must be stored in a sealed container.

Laboratory coats and gowns must be hung on coat hooks provided and not draped over the back of laboratory chairs.

2.6 Storage

When not in use, PPE is to be stored in a suitable location and manner that will avoid damage or contamination through exposure to:

- Moisture, excessive heart, or direct sunlight
- Oil, chemicals, dust, and corrosive atmospheres
- Mechanical damage

Some types of PPE have specific storage requirements. Refer to the specific requirements section in this document and the manufacturer's instructions.

Where storage is out of sight in a cupboard or drawer, suitable signage should be placed to help locate the PPE.

Storage requirements are to be communicated to users via appropriate means such as team briefs and toolbox talks and included in Safe Work Instructions/Safe Work Method Statements where used. Storage should be periodically monitored, such as through workplace inspections.

3. PPE Selection

PPE shall be selected, used, and maintained in accordance with the relevant legislation, Australian Standards or equivalent and Codes of Practice. Related Australian Standards are listed in the References section (5.1).

Personal protective equipment must be:

- properly selected for the individual and the task;
- readily available if supplied by UNSW;
- correctly used;
- clean and functional;
- appropriately stored and maintained.

Trials of PPE may be necessary to determine the most suitable type to match the hazard and user requirements, such as effectiveness of fit and comfort.

Proof of compliance with the relevant Standard is a prerequisite for purchase of nearly all personal protective equipment.

3.1 Protective Helmets

Protective helmets are worn to reduce the severity of injuries caused by objects falling onto a worker's head or the head striking against a fixed object. Protective helmets must comply with the requirements of AS/NZS 1801 Occupational Protective Helmets.

Protective helmets are not to be modified or altered unless done in accordance with the recommendations of the manufacturer/supplier. Any accessories fitted to a protective helmet (such as chinstraps, earmuffs) must be fitted and used in accordance with the requirements of the

manufacturer/supplier. Modifications are not to be made to enable fitting of accessories.

Hats are not to be worn underneath protective helmets. Beanies are not to be worn underneath protective helmets classified as type 2 or 3 (helmets for high temperature, and helmets for bushfire fighting respectively, as described in AS/NZS1801). Beanies may only be worn underneath protective helmets classified as type 1 (general industrial safety helmets) if they do not adversely affect wearing height or profile, and they do not reduce the ability of the helmet to fit securely.

Service Life

Protective helmets are to have the date of issue marked inside the helmet, in addition to the entry made in the PPE Register. Shells of helmets in regular use have a service life of at least three years, and harnesses at least two years. Helmets in regular use are required to be replaced at maximum intervals of two years or following a significant impact.

If an issue date is not recorded, then the date of manufacture should be used to identify when a protective helmet is required to be replaced.

Protective helmets which are used infrequently and stored appropriately need not be replaced at two yearly intervals - the user must examine the helmet regularly with replacement based on condition.

Cleaning, inspection, and maintenance

Helmets and harnesses may be cleaned with warm water and soap or as per the requirements of the manufacturer/supplier.

Protective helmets are to be inspected at weekly intervals by the user. This inspection is to check:

- The shell for damage such as dents, deformation, cracks, excessive discoloration, or weathering and
- The harness for damage such as deformation, stretching, tearing, or missing components.

Worn or excessively dirty sweat bands should be replaced as required.

3.2 Protective Clothing

All workers are required to wear protective clothing as required for the work that they are carrying out. Construction sites may require that long sleeved shirts are worn to provide protection from the sun.

Laboratory clothing

All laboratory users shall use protective clothing appropriate to the tasks being undertaken. These may include long-sleeved laboratory coats, wrap-around gowns, disposable gowns, and boiler suits. Cotton or cotton/polyester is the preferred material.

Specialised clothing may be required for certain hazardous processes. Such additional clothing will be identified in the Safety Data Sheet (SDS) for any hazardous chemicals being used. For instance, when pouring concentrated acid, wear a laboratory coat with a chemical splash apron made out of natural rubber, neoprene, or Viton.

The most appropriate type of protective clothing required for a laboratory will depend on the activities being undertaken:

- Work that predominantly involves biological risks, such as working with microorganisms, biological fluids (blood, urine faeces, sputum), viruses etc., requires the use of a rear-fastening, laboratory gown. A gown has longer sleeves enabling the cuff of the gloves to be pulled over the cuff of the gown, thereby protecting the wrist from exposure to biological material. The gown also provides better protection for the upper body when work is carried out in a seated position.
- Work that predominantly involves the use of chemicals, particularly corrosives (acids and bases) and flammable materials, then the laboratory coat, which is generally made of a thicker cotton material, offers better protection, and complies with the requirement of being able to be removed easily in the event of a chemical splash/spill.
- Flame resistant laboratory coats are available and should be selected for use when working with larger quantities of flammable materials. Refer to AS/NZS ISO 2801 Clothing for protection against heat and flame, for the appropriate performance levels.

In addition, factors such as the ability of the garment to get caught up in equipment should be considered. For example, the open end of the sleeves on a laboratory coat can get caught on or

knock items over whilst the baggy sleeves of a gown can get caught when reaching across equipment.

It is important to take into account whether the work will be conducted in a seated or a standing position. When working with chemicals in a seated position an additional layer of protection may be required such as that offered by a chemically resistant apron worn over the laboratory coat.

The need to protect the gap between where a glove ends, and a laboratory sleeve begins should also be considered. This may not automatically result in a gown being a better choice than a laboratory coat. It may also be acceptable to use protective sleeves over the arms of the lab coat, or the purchase of longer length gloves. This is particularly important where UV light from bench mounted apparatus may impinge upon the wrists.

In summary, the choice of protective clothing to be worn in a particular laboratory is based on risk and thus should be determined in consultation with the literature and with other laboratory users through a documented risk management plan.

Whichever option is taken it is important to communicate the need to wear the clothing as intended i.e., gowns properly fastened at both ties and laboratory coats fully buttoned up.

The following table provides a summary of protective clothing types

Protective Clothing Type	Advantages	Disadvantages
Laboratory Coat	• Offers more protection in the event of a fire, especially if it is designed as flame resistant. • Offers better protection against corrosives • Comes in a range of sizes • Is able to be removed quickly in the event of an emergency	• Gaping sleeves may expose the bare wrist to hazards such as UV light. • The open sleeve may get caught up in equipment or knock things over • Exposes the top of the upper legs and lap when working in a seated position • Exposes the neck • Designed to be used whilst standing • Offers spatter protection only and a further layer of protection such as chemical apron is required for direct spills.
Laboratory Gown	• Offers better protection against biological risks (covers full front of body) • Tight cuffs fully protect the wrist • Offers better protection for the lap and upper legs • The snug fitting sleeve ends prevents the sleeve getting caught up in equipment 3 /knocking things over	• Offers poor protection against corrosives • Offers poor fire resistance • Has limited size choices
Chemical Splash Apron	• Can be worn easily over a lab coat to provide an extra layer of protection against strong corrosives and other dangerous chemicals.	• They cannot be used on their own as they do not provide protection to arms and upper torso.

Protective Clothing Type	Advantages	Disadvantages
Dust coats	• Keeps street clothing clean in dusty areas	

Laboratory clothing must be removed before leaving the laboratory to reduce the risk of contamination to non-laboratory users. Where dust coats are used to simply keep street clothing clean and there is no risk of contamination existing (i.e. no chemical, biological or radiation hazards exist), then the dust coat does not need to be removed. However, to avoid confusion the dust coat should be distinguishable from lab coats or gowns (e.g. use a coloured dust coat).

The University provides a laundry service for laboratory clothing used by staff and research students, including Honours students. Where undergraduate students are required to use PPE such as lab coats and safety glasses in their practical classes, they need to provide their own and are responsible for the maintenance and cleaning of that PPE.

The frequency of home-laundering undergraduate laboratory clothing and the type of detergent selected, should be appropriate for the type and amount of contamination on the garment. Generally, the selection of a regular detergent and a hot wash cycle, followed by line drying, should be sufficient. Laboratory garments should be laundered separately to other clothing.

3.3 Protective eyewear

This section provides information related to safety glasses, splash goggles, face shields, prescription spectacles, contact lenses, laser eye protection.

The following statements are from AS2243.3:

- Appropriate eye protection shall be used to protect eyes from contaminated or hazardous materials or from ultraviolet light.
- Protective eyewear shall be worn unless a documented risk assessment can justify a lesser requirement.

All staff, students and visitors shall use protective eyewear where there is a risk of damage to the eyes. Sources of damage may include splashing of liquids hazardous to the eyes, impact, foreign particle entry, infection by pathogenic agents, exposure to toxic or cytotoxic substances, and laser radiation.

The UNSW Optometry Clinic at the School of Optometry and Vision Science provides a selection and fitting service for safety glasses and goggles.

Service Life

The service life of protective eyewear is reached when:

- the lens/visor surface is scratched, abraded, or etched such that vision is impaired or mechanical strength may be reduced
- frames, fittings, and straps are worn or broken
- for a glass lens, the inside surface is scratched (minute glass particles can be released from a scratch)
- protective eyewear used for general protection, which is in frequent use, is to be replaced two years from the date of issue.

Safety glasses

Safety glasses must comply with AS/NZS 1337.1 Personal eye protection- Eye and face protectors for occupational applications.

Safety glasses have lenses that are impact resistant and frames that are much stronger than standard prescription glasses. Safety glasses must have side shields and must be worn whenever there is a possibility of objects striking the eye, such as particles, glass or metal shards.

Safety glasses may not always provide adequate protection from chemical splashes as they do not seal to the face. Safety glasses may be adequate where the potential splash is minimal e.g., opening eppendorf tubes, or where the chemicals in use are of low toxicity and small volume.

Ordinary prescription glasses do not provide adequate protection from physical injury to the eyes and could even be hazardous to the wearer. For further information on prescription glasses, see the section below on prescription spectacles.

Splash Goggles

Chemical splash goggles shall have indirect ventilation so hazardous substances cannot drain into the eye area. Some can be worn over prescription glasses. They come in a variety of styles for maximum comfort and splash protection. Like safety glasses, goggles are impact resistant.

Splash goggles should be worn to protect the eyes when there is a high potential for splash from a hazardous material. For example, goggles should be worn when working with large volumes and/or high concentrations of hazardous substances; when working with glassware under reduced or elevated pressure; when glass apparatus is used in combustion or other high temperature operations.

Face shields

Face shields are worn to protect the eyes and the face and are required when working with large volumes of hazardous materials, UV light sources or concentrated radiant heat sources. Shields are designed for protection from splashes, some radiation and/or flying particles. Like eyewear, these shields may be designed for different purposes and protect from different hazards, so the choice of face shield must fit the design purpose. Face shields may need to be used in conjunction with safety glasses or goggles.

AS2243.1 Safety in laboratories (Planning and Operational aspects) provides the following examples where a face shield should be used:

(a) where glass apparatus is evacuated, recharged with gas or pressurized;
(b) when pouring corrosive liquids;
(c) when using cryogenic fluids;
(d) when combustion processes are being carried out;
(e) where there is a risk of explosion or implosion;
(f) when using chemicals that can cause direct damage to the skin; and
(g) when using chemicals and biological agents that can be rapidly absorbed into the body via any path e.g., through the skin, eyes or nose.

The level of protection chosen shall take into account any eye and face hazards from other work being carried out in the vicinity. For some tasks, a face shield with a brow guard, chin guard, or both, should be used. AS2243.3 suggests face shields should be worn when opening an autoclave.

Prescription spectacles

Regular prescription glasses or spectacles (as distinct from prescription eye protectors) are generally inadequate against flying objects or particles and could even be hazardous. For persons requiring eye protection in addition to sight correction, it will be necessary to wear safety over-glasses, wide vision goggles or clip-ons over prescription spectacles.

It is important to note the following disadvantages of wearing these with prescription glasses:

- The majority of protectors for prescription eyewear can provide no more than low impact protection because of their lightweight design. Where medium impact resistance is required, medium impact resistant eye protectors complying with AS/NZS 1337 suitable for use over prescription lenses shall be used over the prescription lenses.
- The use of safety goggles worn over prescription lenses will not necessarily provide protection against impact from flying objects. Fracture of the prescription lenses can occur when the safety goggles deflect under impact, even if the goggles are not penetrated

Prescription eye protectors that have been fitted with prescription lenses can provide low or medium impact protection together with prescribed refractive correction of vision based in an individual's need. These are to comply with the requirements of AS/NZS 1337.6 and can be arranged through most optometrists. These do not protect from splashes to eyes or face.

Contact lenses

Contact lenses are not eye protective devices and wearing them does not reduce the requirement for eye and face protection. When the work environment entails exposure to intense heat, molten metals, a highly particulate atmosphere, corrosive substances, or any of the following substances (acrylonitrile, methylene chloride, 1, 2 dibromo-3-chloropropane, ethylene oxide and methylene dianiline), contact lens use should be avoided.

The following safety measures must be implemented should contact lenses be worn by individuals working with chemicals:

- Conduct a risk management plan prior to working with any chemicals or biological material to determine what type of eye protection is required, and whether the wearing of contact lenses should be avoided.
- Notify workers and visitors about any defined areas where contact lenses are restricted.
- Identify all contact lens wearers working in chemical environments to supervisors to ensure that the proper risk management form is completed, and the appropriate eye protection and first aid equipment is available.
- In the event of a chemical exposure, begin eye irrigation immediately and remove contact lenses as soon as practical. Do not delay irrigation while waiting for contact lens removal.
- Instruct workers who wear contact lenses to remove the lenses at the first sign of eye redness or irritation.

Laser eye protection

To ensure the correct laser eye protection is selected users must understand:

- what type of laser is to be used;
- what power and wavelength is the laser;
- whether impact resistance is required.

AS/NZS1336 and the local Laser Safety Officer should be consulted when selecting laser eye protection.

3.4 Protective Gloves

During the course of work staff, students and visitors may be exposed to a range of hazards with the potential to affect hands/arms. Where other means of control are not practical or unsuitable the use of PPE such as gloves may need to be used.

Many laboratory activities could lead to contamination of the hands and therefore potentially serious injury. A risk management plan should identify the type of glove required for the chemical and activity contemplated and the thickness of the material. Disposable gloves will only protect against splashes. If you know that you will be getting your hands wet, you may need thicker gloves.

Protective gloves are available in a wide range of natural and synthetic materials. There is no single glove material, or a combination of glove materials that can provide unlimited protection against all hazards including hazardous substances that can readily pass through some glove types that. It is therefore important that hazard identification and risk assessment are conducted to identify use and type of glove likely to its suitability for use in particular applications.

For the most suitable glove to be provided the following should be considered:

- identified hazards
- requirements or recommendation in safety data sheets
- level of manual dexterity required
- consultation with employees
- sizing and style of glove
- most suitable material to give the required protection
- does the glove need to be liquid proof
- what is the minimum breakthrough time required
- are gloves being considered readily degraded by the chemical
- could the task for which the glove is being used cause mechanical damage (e.g., punctured, torn, cut) thereby affecting the chemical protective properties
- whether wearing protective gloves will introduce any additional hazards
- the glove selection services, and permeation guides available from manufacturer websites.

Laser eye protection

Gloves must be cleaned of all contaminants before storage. They are to be stored away from direct sunlight and extremes of temperature and in accordance with the manufacturer's recommendations. Moisture and artificial lighting may also have a detrimental effect on some gloves.

Cleaning Inspection and Maintenance

Cleaning of gloves should be undertaken in accordance with the manufacturers' recommendations. Gloves used for handling chemicals or cleaning should be rinsed in warm water prior to being taken off to remove any contaminants and dried prior to storage.

Gloves are to be inspected before and after use for signs of defects or wear:

- wear between the fingers
- swelling or shrinking
- cracking, bubbling or pinholes
- seam failure
- rips or tears

Gloves showing signs of defects are to be withdrawn from use and discarded.

Gloves must be removed before leaving the laboratory to reduce the risk of contamination to non-laboratory users.

3.5 Protective footwear

Safety footwear is to be selected, used, and maintained in accordance with AS2210.1 Occupational Protective footwear - Guide to selection, care, and use.

Selection of the types and styles to be used at the workplace is to be determined by risk assessment.

Staff required to access construction sites are required to wear protective footwear as a minimum.

All laboratory users must wear footwear appropriate to the hazards of the laboratory. Australian Standard AS/NZS 2210 should be used to select the correct footwear. As a minimum, enclosed footwear equivalent to Type A (low shoe), Figure 3 in AS/NZS 2210.5 must be worn. Shoes made of absorbent material or woven fabric e.g., most types of joggers, runners, and tennis shoes, should not be worn in laboratories where exposure to corrosives, or chemicals that are harmful by absorption through the skin, could occur.

3.6 Hearing protection

UNSW is required to eliminate or minimise any noise which may damage or impair hearing. WHS Regulation (clause 56-57) defines a workplace as unsafe if any person is exposed to noise levels that exceed an 8-hour noise equivalent of 85dB(A) or that peak at more than 140dB(C).

UNSW workers and visitors in noise hazard areas are to be supplied with, and wear, appropriate hearing protection where engineering and administrative controls do not reduce noise level exposure at a workplace to a level at or below and 8-hour noise equivalent of 85dB(A) or there is a peak noise level more than 140dB(C).

There are many different types of hearing protectors available. Supervisors are to make sure that hearing protectors provide wearers with adequate protection and are suitable for use in the work environment.

Earmuffs

Earmuffs comprise cups that fit over the ears and are sealed to the head with soft cushions usually filled with plastic or foam or liquid.

Earplugs

Earplugs are hearing protectors that are inserted into the ear canal:

- Pre-moulded earplugs - these are inserted into the ear canal without the need for prior shaping and are available in a range of sizes
- User formable earplugs - these are generally made from compressible material that is moulded

by the user prior to insertion into the ear canal. After insertion the plug expands to form a seal on the walls of the ear canal.

- Banded earplugs - banded earplugs are usually made of soft silicone, rubber or plastic and are suspended on a headband

In determining the choice of hearing protection reference should be made to Table A1 in AS/NZS 1269.3 Occupational noise management - Part 3: Hearing protector program

4 TABLE A1	
5 CLASS OF HEARING PROTECTOR REQUIRED	
6 LAeq,8h, dB(A)	7 Class
8 Less than 90	9 1
10 90 to less than 95	11 2
12 95 to less than 100	13 3
14 100 to less than 105	15 4
16 105 to less than 110	17 5
18 Greater than or equal to 110	19 seek specialist advice

Health and Safety personnel can provide a basic noise survey service upon request.

3.7 High Visibility Safety Garments

These garments increase visibility of the wearer to vehicle and plant operators and are specified where visibility is a risk control. Such items must be in accordance with AS/NZS1906.4602 High visibility safety garments.

3.8 Sunscreen

Sunscreens provide broad spectrum protection and come in a range of Sun Protection Factors (SPF), indicating the length of time until the skin will begin to burn. Sunscreens with SPF30+ should be provided to staff, students and visitors who are working outside.

Sunscreen users should be briefed on the manufacturer's requirements of use and reapplication and be made aware of the factors that vary the level of protection afforded by the sunscreen, such as time of day and degree the person is perspiring.

The effectiveness of the active sunscreen products decline over time and users are to make sure that they don't use sunscreen that does not have a visible 'use- by' date or is out of date. Managers are to ensure that sunscreen dispensers are within date.

3.9 Respirators and dust masks

Respirators should only be used to minimise the risk from inhalation of hazards such as dusts, mists, fumes, contaminated aerosols, allergens, and vapours, if other hazard control methods are not practicable.

Situations at UNSW where the use of respirators could be considered include:

- when engineering solutions such as mechanical ventilation, fume cupboards, local exhaust ventilation etc. are not technically feasible;
- while engineering controls are being installed or repaired;
- during field trips
- protecting from allergens
- if emergencies or other temporary situations arise (e.g., cleaning up spills etc.).
- when identified during the risk management process.

Selection of suitable Respiratory Protection Equipment (RPE) to provide protection from specific contaminants must be based on knowledge of the airborne contaminant which creates the hazard, using measurements undertaken in the workplace. Each hazard has particular characteristics, and the nature, toxicity, physical form, and concentration of each contaminant must be included in the assessment.

What are the different classes of respirators?

The two main types are:

- Air-purifying respirators and;
- Supplied-air respirators.

a) AIR PURIFYING RESPIRATORS

Air purifying respirators must not be used if the hazard is an Oxygen deficient environment.

Some Air-Purifying Respirators work by filtering out particulates (e.g., dusts, metal fumes, mists, etc.) from contaminated air. Others can purify air by adsorbing gases or vapours onto an adsorbing material (like charcoal) in a cartridge or canister. They are either negative pressure units (most common types used at UNSW) or positive-pressure units such as powered air-purifying respirators (PAPRs). A powered air purifying respirator requires a battery to operate. The battery functions to supply power to the impellor that draws ambient air through the filter. A powered air purifying respirator has a headpiece which can be in the form of a respirator hood, mask, a loose-fitting face-piece or a full face-piece.

Negative pressure Air Purifying Respirators are tight-fitting and are available as either:

- half-face mask (covering the face from the nose to below the chin), or
- full face-piece (covering the face from above the eyes to below the chin).

Examples include:

- disposable dust masks (half face only);
- particulate respirators which have a filter for trapping particulate matter;
- chemical cartridge respirators that can have a combination of chemical cartridges and a dust pre-filter. Different options are available such as acid gas cartridges (for example if exposure to hydrochloric acid was an issue) or organic vapour cartridges (e.g. if the issue was related to ethanol or xylene).

Cartridges are colour coded in accordance with the type of contaminant they offer protection against. e.g.

- Dust -- purple cartridge
- Solvents – black cartridge
- Formaldehyde – black cartridge
- Ammonia – green cartridge
- Acid Gas – yellow cartridge

There are three classes of particulate filters suitable for filtering finely divided solid or liquid particles, or both, from inhaled air. These are classified in accordance with the tests in AZ/NZS 1716 and are classified as P1, P2 and P3. Particulate filtration, P1 to P3, can be provided by re-usable canister respirators and single-use disposable masks.

P1 classification is for protection against mechanically generated particulates. Suitable applications include woodworking, workshop, and construction type activities.

P2 classification is for protection against mechanically and thermally generated particulates, mists, aerosols (including biological aerosols) and fumes.

Class P3 filters are intended for use against all particulates including highly toxic materials. However, for non-powered respirators, a class P3 classification can only be assigned where a class P3 filter is used with a **full-face** piece. *[If a P3 filter is used with a half face respirator then a maximum rating of P2 is obtained]*

Note:

Air purifying equipment for self-rescue, Self-Contained Breathing Apparatus and Compressed Gas RPE are specialist items for use in specific circumstances and are not covered by this guide. Expert advice on selection, use and maintenance is required.

b) SUPPLIED AIR RESPIRATORS

These respirators are used where there is a potential for an Oxygen deficient environment or if there is a concentration of toxic gas which is immediately dangerous to health. Supplied-air respirators supply clean air from either an air-filled gas cylinder i.e., Self-Contained Breathing Apparatus (SCBA)

or from an external airline which supplies clean compressed air from outside the work area.

Supplied-air respirators may have either tight-fitting or loose-fitting respiratory inlets. Respirators with tight-fitting respiratory inlets have half or full face-pieces. Types with loose-fitting respiratory inlets can be hoods or helmets that cover the head and neck.

Points to consider before choosing a respirator

- The risk management plan must have identified the hazardous chemical that present the inhalation risk. The hierarchy of risk controls should have been implemented to reduce the risk as much as possible before applying the control of PPE.
- An attempt should be made to quantify the potential exposure from the hazardous chemical - this can be done provisionally using simple and inexpensive gas detection systems such as a pump and colorimetric tubes (contact your HS coordinator).
- Determine whether a half face or full-face respirator is required.
- Once the appropriate respirator and cartridges are selected a fit test must be conducted. The wearer may be required to obtain medical clearance if the duration of use is frequent or of significant duration (e.g., may not be required if the use is for a one-off clean-up of a chemical spill which may only require wearing it for a few minutes duration).
- Factors which influence the effectiveness of the seal of the respirator onto the face must be eliminated e.g., no beards, long sideburns, or stubble.
- Potential wearers must be trained in the respirator's selection, use, cleaning, storage, and maintenance.

Maintaining the Respirator

Reusable respirators must be cleaned after use. Solvents must never be used to clean respirators.

The cartridges should be removed, and the respirator washed in warm soapy water, rinsed and left to dry. Once dry the respirator and cartridges should be returned to a sealed bag or container and stored in a personal locker or cupboard dedicated to the storage of personal protective equipment. The manufacturer's instructions will provide further details on maintenance which can be incorporated into the Safe work procedure for the use of the respirators.

Any defects such as scratches, loose parts, tears, holes etc. can adversely affect the proper functioning of a respirator and such, the respirator should not be used.

The use of the Cartridges should be tracked/logged to ensure they remain effective. Most cartridges have an expiry several months after removal from their original packaging, but this can be reduced depending on the amount of use.

There is no absolute way of determining whether or not cartridges are still effective, however as an example, if they are being used to protect against a material that presents an odour, as soon as the odour starts to become noticeable whilst wearing the respirators confirms that the cartridges are no longer effective. Often it is easier to use a blanket rule such as: replace 6 months after first use. In any case they must never be used past their expiry date.

4. Responsibilities

4.1 Supervisors and Managers

All staff who are designated as supervisors, area managers or laboratory managers are responsible to ensure staff, students, and visitors:

1. are supplied with the appropriate PPE for their work activities;
2. ensure that the PPE required, in the area of their responsibility, is worn
3. Reusable PPE is kept clean and maintained.

4.2 Users of PPE

All staff, students and visitors must use and look after the PPE provided to them for their personal protection

Inspection and Review

Users are to inspect PPE for:

- signs of deterioration, cracks, or distortion
- excessive scratches (on eyewear)
- missing/damaged components
- modifications or alterations which have not been specified by the manufacturer
- expiry date

Under no circumstances is PPE to be used in a sub-standard condition. Faulty, damaged, or excessively worn PPE is to be:

- withdrawn from use immediately; and
- replaced
- Workers are to report any expired, faulty, or sub-standard equipment to their Manager who is to make sure that a replacement item is provided. Users are also to report any problems they may encounter when using the PPE.

Managers are to:

- Reorder and replace worn, expired or faulty equipment as necessary
- Make sure that scheduled inspections/maintenance is carried out on PPE where required
- Brief staff in the correct use of PPE and make sure they are using it for the intended purpose

4.3 Review and evaluation

Risk management

Risk management plans must be periodically reviewed to ensure that all hazards and risks in the laboratory have been identified and eliminated or controlled by the use of the Hierarchy of Risk Controls.

PPE

The adequacy of personal protective equipment must be regularly assessed to ensure that personal injuries are not occurring.

Appendix A: Definitions

Hierarchy of Risk Controls: The method of addressing and implementing risk control measures in order of importance, which is:

1. Elimination: Remove the hazard
2. Substitution: Replace with a less hazardous substance or activity
3. Engineering: Examples: install guards on machinery, provide fume extraction
4. Administration: Signs, Procedures, Following safe work practices, Training
5. Personal protective equipment: Respirators, ear plugs, etc.

PPE: Personal protective equipment, includes protective clothing.

Appendix B: References

Australian Standards:

- AS/NZS 1270: Acoustics – hearing protectors
- AS/NZS 1269.3 Occupational noise management - Part 3: Hearing protector program
- AS/NZS 1336: Eye and face protection guidelines
- AS/NZS 1337: Personal eye protection
    - Part 1: Eye and face protectors for occupational applications
    - Part 6: Prescription eye protectors against low and medium impact
- AS/NZS 1715: Selection, use and maintenance of respiratory protective equipment
- AS/NZS 1716: Respiratory protective devices
- AS/NZS 1801: occupational protective helmets
- AS/NZS 2161: Occupation protective gloves (Set)
- AS/NZS 2210: Occupation protective footwear – Parts 1,3,4,5
- AS/NZS 2243: Safety in laboratories (series)
- AS/NZS ISO 2801 Clothing for protection against heat and flame
- HB 9: Occupational personal protection, Handbook

Local WHS Documents

HS701 Personal Protective Equipment Signs
HS419 Outdoor Workers Guideline
HS406 Fieldwork Guideline
HS801 Contractor Safety Manual

Appendix C: Version Control

Version	Authorised by	Approval Date	Effective Date	Sections modified
1.0	Director, Human Resources	4/6/2007	4/6/2007	New Document
1.1	Director, Human Resources	20/5/2008	4/6/2007	4.1.3.2 Protective eyewear section expanded to include the specific need for goggles where a chemical splash hazard exists
1.2	Director, Human Resources	17/7/2008	4/6/2007	4.1.3.2 Laser eyewear requirements added
1.3	Director, Human Resources	23/6/2010	4/6/2007	Section 4.1.3.1 Provide more information to assist with the choice of lab gown or lab coat for a laboratory application.
2.0	Director, Human Resources	9/04/2010	9/04/2010	Review entire document. Reformat to UNSW Guideline template (ML)
2.1	Director, Human Resources	10/12/2010	10/12/2010	Added reference to PPE Signs in 3.1 and 4.2 Changed PPCE to PPE
2.2	Director, Human Resources	23/03/2013	23/03/2013	Updated legislation reference with WHS Act and Regulation Updated Branding Logo in accordance with UNSW Branding Guidelines. Modified the document identifier from OHS to HS in accordance with WHS legislation review
2.3	Director, UNSW Safety and Sustainability	30 April 2014	30 April 2014	Reviewed for administrative updates
2.4	Director, UNSW Safety and Sustainability	2 October 2014	2d October 2014	Reviewed for inclusion of construction & workshop PPE, added protective helmets, high vis clothing, sunscreen, PPE storage. Sections reorganised. References checked.
2.5	Director, UNSW Safety and Sustainability	24 February 2016	24February 2016	Removed PPE registration and Distribution section and merged with Issuing PPE. Reference to flame resistant lab coats included. Minor administrative updates
3.0	Director, Risk & Safety Management	8 August 2022	8 August 2022	Administrative update, template update and removed from Governance.

Updates to this document

Any suggestions, recommendations or updates to this document should be emailed to safety@unsw.edu.au with the email header stating *GUIDELINES UPDATE HS659.*