

## PPE part 2 – Specific PPE items

**P**ersonal Protective Equipment (PPE) is the last line of defence against pesticide exposure. PPE is clothing and devices that protect the body from injury or illness.

Technical note number 14 – PPE part 1, outlines the general requirements for selection, use and maintenance. The purpose of this technical note is to provide detailed information regarding specific items of PPE commonly used by Pest Control Operators (PCOs).

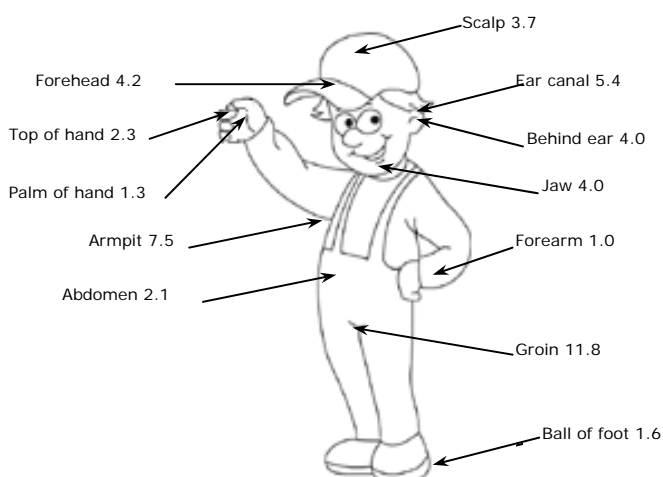
### Body and head protection

The rate at which pesticide is absorbed through skin varies over the body due to variations in characteristics such as skin thickness, density of hair follicles and sweat glands. Certain areas of skin are therefore more susceptible to pesticide absorption.

Figure 1 provides a guide to the rate of dermal pesticide absorption relative to the forearm.

#### Head, neck and face protection

The head is almost four times more likely to absorb pesticide than the forearm. The ear canal is a particularly susceptible area. For this reason it is essential that PCOs wear a washable hat or hood when spraying overhead. A wide-brim hat, will also help to protect the ears, face and neck.



**Figure 1 – dermal absorption rates relative to forearm (rate = 1.0)**

Face protection is discussed in more detail later in this technical note, when considering eye protection and respirators.

### Body protection

Many pesticide labels and Material Safety Data Sheets (MSDSs) specify that coveralls buttoned to the neck and wrist should be worn when handling pesticide. Where a risk assessment indicates low risk due to low dermal absorption, low toxicity or little risk of skin exposure, washable cotton coveralls should suffice. Coveralls should be selected in a larger size to allow for easy movement when worn over work clothes, and should not be worn in the driver's cabin of the vehicle.

If the label or MSDS indicates that chemically resistant clothing should be worn, then the PCO should perform a risk assessment to determine if a PVC apron will suffice, or whether chemically resistant waterproof coveralls or jacket and pants should be worn.

When mixing and preparing very concentrated, toxic pesticides or those with a high dermal absorption rate, waterproof aprons can be worn over coveralls to protect susceptible areas.

If there is a chance of spray or liquid pesticide wetting through coveralls to clothes underneath, waterproof coveralls or jacket and pants should be worn instead.

Coveralls, hats, aprons and any other items worn to protect the body, head and neck, should be maintained properly to ensure adequate protection. See the 'Maintaining PPE' section of technical note number 14 for more information.

### Hand and foot protection

#### Gloves

Whilst latex or thin disposable gloves allow PCOs greater movement when performing delicate operations like nozzle adjustment, they are easily damaged and do not provide adequate protection from pesticide exposure.

Elbow-length PVC or nitrile rubber gloves usually satisfy the label or MSDS requirement for protective gloves. If the label does not specify the need for hand protection, latex gloves may help to prevent accidental exposure or provide protection from other workplace hazards.

If in doubt about the type of gloves required, PCOs should check with the chemical

manufacturer or PPE supplier that the gloves purchased provide adequate protection from the chemicals used.



The ends of elbow-length gloves should be folded over slightly (as illustrated above) to minimise the risk of pesticide trickling inside. To further prevent contamination, PCOs should ensure their hands are clean and free of pesticide residue before donning gloves.

Each pair of PVC or nitrile rubber gloves should be checked for holes and signs of wear prior to every use.

Gloves should be rinsed off after use, and regularly cleaned thoroughly by turning them inside out, washing them in warm soapy water and hanging them out to dry. Gloves should be filled with water while cleaning to check for leaks.

A PCO should have several pairs of gloves allowing access to a clean pair in the event of a spill.

### Boots

Ideally, chemically resistant boots such as rubber gumboots should be used when working with liquid pesticides, as the chemicals will run off immediately, and any residue can be easily removed following application.



Many PCOs wear leather boots such as blundstones. Whilst these boots are sturdy and offer protection from falling objects and rough terrain, the leather is not impervious to liquid and readily absorbs pesticide. Leather boots must be treated regularly with waterproofing agents to ensure they remain impervious. However, in the event of a spill, where leather boots are extensively contaminated with concentrated pesticide, a risk assessment should be conducted to determine if they will still provide adequate protection, or whether new boots should be purchased.

To further reduce the risk of pesticide exposure as a result of contamination of the legs and feet,

pant legs should be worn outside or over the top of boots. This prevents pesticides from running down the pant leg and collecting inside boots.

For additional foot protection in certain situations, disposable boot covers are available which provide a fluid and particulate barrier. Caution should be used, however, as they may provide only limited chemical splash protection.

PCOs should carry a separate pair of shoes for use prior to and following pesticide use. Boots used when handling and applying pesticides should not be worn in the driver's cabin as there is a risk of cross-contamination.

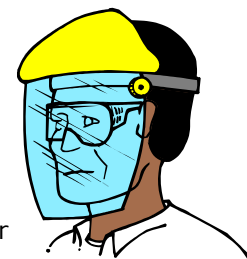
Boots should be washed down following the application of pesticide and stored in the rear of the vehicle separate to both the chemical storage area and clean items. They should be checked regularly for damage and replaced as necessary.

## Eye and face protection

Eyes are very sensitive to pesticides and easily damaged. Eyes can be exposed to pesticides in a number of ways including:

- during mixing and preparation of liquid pesticides when splashes may occur
- exposure to mist during spraying
- when pesticide dust is stirred up or puffed into the air
- transferral from the hands if eyes are touched or rubbed after handling pesticides
- as a result of the vapours generated when highly volatile or highly soluble pesticides evaporate.

When considering eye protection for any particular job, PCOs should also take into account whether face protection is necessary, and then select the most appropriate option. A number of options are available for protecting the eyes such as:



- safety glasses with brow and side shields
- safety goggles that fit tightly against the face; and options which also protect the face include:
- face shields with browguard and inwards cupping around the face
- a full face respirator.

Any protective eyewear should be tried on while the PCO is wearing their respirator and hat to ensure a comfortable and secure fit. Ordinary prescription glasses or sunglasses may not provide adequate protection from many pesticides as spray or splashes may enter around the edges.



Face shields and goggles should be rinsed off after use, and cleaned in soap and water, rinsed and wiped clean, then hung in a shaded, well-ventilated place to dry at the end of each day. Any items with rubber or elastic straps should not be hung in direct sunlight as it will rapidly degrade the material.

## Respiratory protection

The purpose of respiratory protective devices (respirators) is to allow the wearer to breathe air that is free of contamination. Some respirators supply air from a tank or via a hose (such as SCUBA, air-line or air-hose respirators). Other respirators, known as air-purifying respirators, have cartridges which filter out the contaminants from the air before it is inhaled. Some filter out gases such as Methyl Bromide, and others filter out particulates such as dusts or spray droplets.

### Selecting a respirator

Respirators are most often needed when working with fumigants, liquid sprays and dusts to protect against pesticide inhalation. PCOs should carefully read the label and MSDS for each pesticide they use to determine the type of respirator required. The choice of respirator is dependent upon factors such as the type and concentration of pesticide, frequency and length of use, and application method.

Employers should consider implementing a respiratory component as part of their PPE Program that is consistent with AS1715 to ensure maximum efficiency of the respirators. See the 'PPE Program' section of technical note number 14 for more information.

The two main types of respirators used by PCOs are non-powered air-purifying respirators in half-facepiece or full-facepiece.

The half-face respirator is designed to provide a close fit over the nose, mouth and chin and may have one or two replaceable filtration cartridges.

The full-face respirator is designed to protect the eyes, nose and mouth and provide a seal around the face and chin. It may have one or two replaceable filtration cartridges.



### Particulate filters

PCOs working with dusts and sprays will require particulate filters for their respirators, usually as part of a combination filter due to the presence of organic solvents.

There are three classes of particulate filter:

- *Class P1* – intended for use against mechanically generated particulates (for example many pesticide dusts and sprays)
- *Class P2* – intended for use against both mechanically and thermally generated particulates (for example metal fumes)
- *Class P3* – intended for use against all particulates including highly toxic materials (for example beryllium).

Class P1 and P2 filters are usually designed for half-face respirators, whereas Class P3 filters are designed for use only with full-face respirators.

### Gas filters

PCOs who work with toxic gases, such as Methyl Bromide or pesticides that produce organic vapours, should ensure that their respirators are fitted with the appropriate type of gas filter. The types most commonly required for PCOs include:

- *Type A* – for use against organic gases and vapours (for example, many solvents used in common pesticides)
- *Type MB* – for use against methyl bromide.

Gas filters are also made for specific chemical types.

Once you have determined the type of gas filter you require, you must then determine which class you require. The classification of gas filters is different to the classification of particulate filters. Each gas filter may be available in one of four classes; AUS, 1, 2 or 3. These classes are arranged in order of increasing capacity. The higher the number, the longer the filter will last for a given concentration of gas where other factors remain constant.

### Combination particulate and gas filters

Combination particulate and gas filters provide protection against low concentrations of certain gases or vapours, and have an integrated particulate filter of Class P1, P2 or P3.

Mostly commonly, a respirator with a combination Class P1 particulate and Type A gas filter is used by PCOs, as many commonly used pesticides generate droplet particulates but have solvents which produce organic vapours.

If required, gas filters of specific types can be fitted to a respirator with a separate particulate filter attached on the inlet side.

**Always check the label or MSDS to ensure the appropriate respirator and cartridge has been selected for the pesticide used.**

## Use of a respirator

PCOs should ensure that their respirator is compatible with their other PPE such as eyewear and hats. They should also ensure that the respirator fits well every time they wear it to prevent exposure to contaminants. Facial hair may become an issue if a good seal is not achieved between the respirator and the face.

The fit of a respirator can be checked using a positive test and/or a negative test.

### Positive fit test

To perform a positive test, fit the respirator on to your face and adjust the head and neck straps to achieve a good seal and comfortable fit. Cover the exhalation valve with your hand(s) (as illustrated below) and gently exhale. If any air escapes, the seal is not correct, and you should refit the respirator and retest. If you cannot achieve a proper seal, another size or shape respirator should be chosen.



### Negative fit test

To perform a negative test, fit the respirator on to your face and adjust the head and neck straps to achieve a good seal and comfortable fit. Cover one filter air intake with each hand (as illustrated below). Inhale gently until the mask collapses slightly onto the face indicating a good seal. Hold your breath for ten seconds. If any air enters the mask, the seal is not correct, and you should refit the respirator and retest. If you cannot achieve a proper seal, another size or shape respirator should be chosen.



### Respirator maintenance

Respirators should be cleaned regularly by removing the filters, wiping all surfaces down with warm, soapy water, rinsing well and drying in accordance with the manufacturer's instructions.

Respirators should be stored in a clean, dry, airtight container, away from oil and corrosive substances, and out of direct sunlight.

All parts of the respirator should be inspected regularly for deterioration and filters should be replaced regularly. PCOs may find that breathing becomes more difficult as filters become choked with trapped particles. If odours can be detected while using a respirator, it is highly likely that an adequate fit has not been achieved, filters are not working effectively and should be replaced, or the wrong type of filter is fitted for the pesticide being used.

## Australian Standards for PPE

All PPE must comply with Australian Standards (AS/NZS) and will often be marked with the Australian Standards logo and the corresponding number. When selecting PPE, look for the AS number or symbol printed on the product.

### Respirators

AS/NZS 1715 – *Selection use and maintenance of respiratory protective devices*

AS/NZS 1716 – *Respiratory protective devices*

### Eye protection

AS/NZS 1336 – *Recommended practices for occupational eye protection*

AS/NZS 1337 – *Eye protectors for industrial applications*

### Protective clothing

AS/NZS 2161 – *Occupational protective gloves*

AS/NZS 2210 – *Occupational protective footwear*

AS/NZS 4501 – *Occupational protective clothing*

### FURTHER INFORMATION

Personal protective equipment  
technical note number 14 – August 2007  
*PPE part 1 – selection, use and maintenance*

Risk Assessments  
technical note number 10 – December 2005  
*The law and you – risk assessments*

Health risks of common pesticides  
technical note number 8 – March 2005  
*Commonly used pesticide chemical classes*

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