Trainee Workbook

Unit Standard 10507

Use personal protection equipment within an electricity network environment Level 2 Credits 4

Name:....



www.esito.org.nz

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Glossary

The words in this glossary are in green throughout the book.

When I see this word... It means...

Act of Parliament A law created by the government.

Eliminate Remove or get rid of.

Exposure to hazards Having no protection from something dangerous.

Flame retardant Unlikely to set on fire/produce a flame.

Hazard A hazard is something that could cause harm.

Isolated Removed from anything else – on its own.

Legislation Another word for the law created by government.

Minimise To reduce or lower the effects of something.

Notifiable Work that is notifiable must be reported to the Department of Labour.

Polices and procedures The rules of your workplace.

Regulations Rules or laws.

Respirator Type of gas mask for help with breathing.

Synthetic Artificial (man made) material.

Tailgate This term is used in the electricity supply industry. It refers to meetings which

take place before a job starts so that workers can share information, identify

hazards and develop control plans if required.

1. Introduction

Unit standard objectives

Unit standard 10507 forms part of the National Certificate in Electricity Supply (Level 2). It is an important introduction to keeping yourself, and those around you, safe while at work.

Use this workbook to help you gain the skill and knowledge to:

- select the best electricity network personal protective equipment (PPE) for the task
- use electricity network PPE correctly
- service electricity network PPE, as required by law
- report accurately on the status of PPE.



Prerequisite

Before beginning this unit standard you need to have completed unit standard 6401 – Provide first aid, or be able to demonstrate the knowledge and skills needed for that unit.

Getting started

Icons are used throughout the ESITO trainee workbooks. The most common are listed below.



Pay attention: This information is important.



Activity: The activities will help you prepare for the assessment task. The activity asks you to:

- think about your past experiences
- · think about the information and ideas you have been studying
- think about how you can use new skills in the future.



Website: This icon refers to the world wide web.



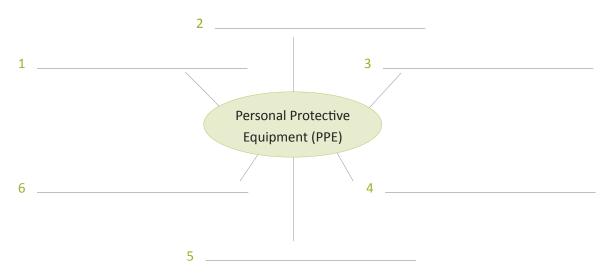
Additional information that might be of interest. Sometimes, this space is used to explain ideas in more detail.

2. Knowledge check

This section looks at your prior knowledge and prepares you for what's to come. Answer the questions to find out what you do and don't already know.

What are three industry standards and codes of practice, or items of government legislation, that affect the use of PPE?

Name six types of PPE commonly used in the electricity supply industry.



Select two of the above PPE items and explain where you would use them.

1

Explain in your own words why we use PPE.

3. Legislation and industry practice



Why use PPE?

We use Personal
Protective Equipment
(PPE) to keep ourselves,
and those around us,
safe in the workplace.

We also use it because the law, and industry practice, says we must.

Government legislation and industry practice defines the PPE we use,



how we use it and when we use it.

So, before we take a look at PPE itself, let's have a brief look at government legislation and industry practices. They are designed to help keep you and your workmates safe while at work and affect what you and your workmates will select as the best PPE for the job.

Government legislation and regulations

Government develops legislation and regulations to guide business and industry practice. The following legislation, and subsequent amendments, directly affects health and safety in the electricity supply industry.

- Health and Safety in Employment (HSE) Act 1992.
- Electricity Act 1992.
- Electricity (Safety) Regulations 2010.

Industry codes of practice and standards

Businesses and industry groups develop codes of practice and standards that interpret the legislation. Businesses can then develop policies and write detailed procedures that meet the requirements of legislation and regulations. The codes of practice and standards that will affect you in your everyday work are:

- New Zealand Electrical Codes of Practice (NZECP).
- Australian Standards/ New Zealand Standards (AS/NZ).

Legislation and industry practice

Safety Manual – Electricity Industry (SM-EI) Parts 1, 2 and 3

This industry manual is published by the Electricity Engineers Association of NZ (EEA) and is regularly reviewed. There are three parts, published in two booklets: SM-EI Parts 1 and 2 and SM-EI Part 3. The SM-EIs outline the requirements for the management of safety within the electricity industry. They include recommendations on good practice and some of the requirements demanded by law.







Check the EEA website, under the publications option, for the latest copies. www.eea.co.nz



For more information on the legislation and standards mentioned above, refer to the trainee workbook for unit standard 12300.

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4. What is Personal Protective Equipment?



PPE ... protection against hazards

Working in the electricity supply industry means that you are often placed in situations where there may be hazards present. Personal Protective Equipment is the gear that you commonly use to keep you and those around you safe in the workplace. PPE includes clothing as well as equipment such as eye protection, safety helmets and safety harnesses.



Electric arc blasts

An example of where PPE gives protection is where an electric arc blast occurs.

An electrical arc blast/flash is a result of massive energy release. When large amounts of energy are released, metal conductors can be vaporised and an air blast can be created by the superheated vapours. The vapours from the blast may be toxic and the noise produced can result in ear damage to those in the path of the blast.

Light from the arc flash can cause temporary or permanent eye damage as well as burns to the skin. Any metal objects in the path of the blast will absorb energy which can cause them to heat up to high temperatures. For this reason, it is important not to wear any jewellery or steel framed glasses.



5.1 How much do you already know about using PPE? Read the statements below and decide if they are true or false.

	True	False
Rubber insulating gloves can be worn if they have cracks in them.	0	0
You can wear a baseball cap instead of a hard hat to protect your head.	0	0
PPE can be cleaned with mild soap and water.	0	0
My own glasses will be enough to protect my eyes in the workplace.	0	0
You should not use ear plugs that have become hard.	0	0
As long as I can hear myself I don't need ear protection.	0	0

Introduction

This section looks at commonly used PPE and gives general information about how to correctly use it, inspect it and maintain it. Using PPE correctly plays an important role in achieving safety in the electricity supply industry.

Overalls

Overalls are only a part of the industrial work wear available. Flame retardant overalls should be worn to protect your arms, legs and torso from the effects of a possible exposed electric current.

Flame retardant does not mean fireproof. Overalls may still burn or get damaged when exposed to an arc blast/flash from electrical equipment. The main function of the flame retardant fabric is to reduce the heat transfer to the wearer.

Reflective strips are added to protective overalls to make the wearer more visible. Reflective graphics can also be added to overalls to identify an individual, the employer and role of the person wearing them.

High visibility vests are often worn by people who don't normally wear overalls. The colour of vests, and the top half of overalls, is generally fluorescent orange, yellow or green.

Clothing worn under overalls should be natural fibre (cotton) or flame retardant. This includes jerseys, sweatshirts, t-shirts, shorts and underwear. Underwire bras must be replaced with bras that do not have underwire or metal fittings.

At no time should you wear synthetic fabric or anything with metal fittings. Synthetic clothes of any kind offer you no protection should you experience an electric shock and could melt, giving you more severe injuries.



Any clothing you wear needs to be made from a natural fibre.

Inspecting overalls

Before use you should check your overalls to make sure that:

- there are no holes
- any damage has been professionally repaired
- any damage has been fixed with flame retardant materials, NOT synthetic.



Maintenance of overalls

The effectiveness of your flame retardant overalls can be altered by how many times they have been washed and how old they are. The following steps should be taken when caring for your overalls.

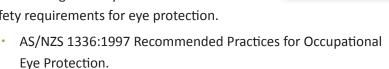
- Fire retardant overalls can be machine washed or drycleaned. Make sure you follow the instructions on the inside label, or draw them to the attention of the drycleaner.
- Repairs need to be made with similar fire retardant material and cotton thread.

Overalls should be replaced regularly as there is no easy way of knowing if they are still fire retardant, once they have been cleaned a few times. Your employer will be able to give you guidance on how to correctly clean your overalls, and when to replace them.

Eye protection

To protect your eyes you should wear eye protection in all specified eye protection areas and in any other area where there is a risk of injury to the eyes. Use close fitting goggles or face masks unless safety spectacles will give you enough protection.

The following industry standards detail the safety requirements for eye protection.



AS/NZS 1337:1992 Eye Protectors for Industrial Applications.

Inspecting eye protection

Before use, you should check your eye protection to make sure that:

- there are no cracks in the frame or lenses
- you can see clearly through the lenses
- they fit you comfortably.

Maintenance of eye protection

Store eye protection out of direct sunlight. Clean when necessary by following the manufacturer's directions.



Head protection

Safety helmets (hard hats) must meet industry standards. They must be worn in all specified areas, and any other areas where there may be a risk of head injury. Only non-conducting helmets are to be worn.

The common areas where safety helmets are needed are switchyards, construction sites and any areas near cranes and lifting devices. You don't need to wear safety helmets in control rooms or canteens.



There are accessories available for safety helmets. These are additions which make helmets safer and/or more comfortable, for example:

 straps which are worn under the chin or behind your neck to keep the helmet in place

- eye or face shields
- a wide brim to give shade and sun protection
- neck flaps, also for sun/rain protection
- lining, for comfort in cooler weather
- earmuffs.



Inspecting safety helmets

Before use, you should check your safety helmet to make sure that if fits you correctly and:

- · there are no cracks or dents
- the issue date is within the usage life identified in AS/NZS 1801
- the accessories (such as straps and eye shields) are in good repair.

Maintenance of safety helmets

Store safety helmets out of direct sunlight. Wash your safety helmet when necessary using mild hand soap and water. Do not mark or put stickers on your safety helmet as this weakens it.



5.2 Which industry standard provides guidance on helmet usage?





Hearing protection

You are exposed to workplace noise throughout your day at work. When you are exposed to noise for a long time there is a cumulative (or growing) effect on your hearing. So, the longer you are exposed to a loud noise, the more likely it is that you will have hearing loss. If you don't protect your ears against workplace noise, you risk permanent hearing loss.





Protect your ears against noise. If you dont, you risk permanent hearing loss.

Use hearing protectors to avoid permanent hearing loss

Using hearing protectors can help you avoid hearing loss. The main types of hearing protector are earmuffs and ear plugs. Either type can provide effective protection provided it makes an airtight seal in your ear (earplugs) or around it (earmuffs). You should wear the hearing protector that best suits the situation.

Before we look at earmuffs and earplugs in more detail, do this quick self-test. If you answer "Yes" to any of these questions, have your hearing tested! You could be at risk of permanent hearing loss.

Question	Yes	No
At work, do your colleagues have to shout at you before you can hear them, when they are about an arm's length away?	0	0
Do you have to turn up the volume on the TV or radio after a day at work?	0	0
Do you get ringing or buzzing in your ears after work, or after particular jobs at work?	0	0
Do you often have to ask people to repeat things they have said?	0	0
Does your family say you have difficulty hearing them when you are at home?	0	0

Earplugs

Earplugs are a common form of hearing protection. They are made of breathable foam material, are easy to insert and remove and offer highly effective noise protection.

Some earplugs (for example, the compressible foam type) come in only one size. If the plugs are made in several sizes, you need the right size for each ear. When using earplugs, you should always read the manufacturer's instructions.

To fit earplugs, follow these three steps.

- 1 Reach around your head and take hold of the back of your ear about half way down.
- 2 Gently pull your ear outwards and upwards to straighten the ear canal.
- 3 Insert the plug into your ear canal with the other hand.

If the plug is a compressible foam type:

- roll the plug slowly and smoothly into a thin crease free cylinder (this could take up to 30 seconds, possibly longer if you haven't done it before)
- quickly place the earplug well into your ear canal and hold it in place until it has begun to expand and block the noise. Aim to get three-quarters of the length of the plug into your ear canal.



Remove plugs slowly so that the suction does not hurt your ear.

Inspecting earplugs

Before use, check your earplugs to make sure:

- they are clean
- · the plugs haven't become hard
- they fit you comfortably.

Maintenance of earplugs

Take the following steps when caring for your earplugs.

- · Keep plugs clean with mild soap and water.
- Replace plugs if they become hard or damaged.





Earmuffs

Earmuffs provide effective noise protection. They are made in different grades to give strength without being too heavy.



Wearing earmuffs

When using earmuffs look at them to see which way they are meant to be worn. Some earmuff cups are marked top or front and you should wear them that way. Oval shaped cups are meant to be worn so that the oval is upright.

To ensure that earmuffs perform to manufacturer's specifications and provide maximum protection, follow these four steps.

- 1 Brush your hair away from your ears.
- 2 Place the muffs over your ears.
- 3 Adjust the headband so that it takes the weight of the cups and holds them firmly in place.
- 4 Run your fingers around the cushions to make sure that they are sealed well against your head.

Some things can prevent a good seal. If you are unable to get a good seal, try different earmuffs or try earplugs instead. If you wear prescription glasses, you might consider changing the frames to a thinner type.



Always wear hearing protection in designated areas.

Inspecting earmuffs

Before use, check your earmuffs to make sure:

- there is no damage to the earmuffs
- the cushions of the earmuffs are soft and will sit comfortably around your ears
- they fit you comfortably.

Maintenance of earmuffs

Take the following steps when caring for your earmuffs.

- · Wash your earmuffs, when necessary, using mild soap and water.
- Don't stretch the headband of your earmuffs as they will not fit as well.
- Replace the cushions on your earmuffs as soon as they start to harden.
- Replace any damaged part of your earmuffs.

Get used to wearing hearing protectors

It takes two to three weeks to get used to wearing hearing protectors. Once you are used to them, you will:

- · feel less stressed while you're working
- feel less tired at the end of the day
- know your hearing is safe.



For more information, refer to the following link. www.osh.govt.nz/order/catalogue/pdf/listen-p.pdf

Respirators

Respirators are used when there is a chance you might be exposed to poor quality air. It is important that any respirator you are using fits you comfortably and hasn't been damaged in any way. You also need to make sure the filter being used in the respirator best suits the situation.



Refer to SM-EI 2.1305 for details on the use of respirators.



Any work involving respirators is considered notifiable work. This means that an OSH (Occupational Safety and Health) Inspector needs to be told of the work 24 hours before it is started. Notification of the work must be given in writing.



The Department of Labour Health and Safety site has further information on respiratory protection:

www.osh.govt.nz/order/catalogue/pdf/RespiratoryProtection





Footwear

Safety footwear must be used in all situations where there is risk of injury. Safety footwear commonly protects against falling equipment and injuries that could be caused by stepping on sharp objects.

Safety footwear must meet the current safety standards.



Inspecting footwear

Before use, check your footwear to make sure:

- it fits you correctly
- there is no damage
- there are no holes or cracks in the soles.

Maintenance of footwear

Take the following steps when caring for your safety footwear.

- Periodically wash footwear inside and out and leave to air dry.
- Make sure that any repairs to cuts, and stitching or replacement of soles, are made by professionals.

Rubber insulating gloves

Rubber insulating gloves are worn to protect you from the possibility of electric shock. They should be a good close fit, especially in the palm of the hand.

Select the right Class of glove

Rubber insulating gloves are available in six defined voltage classes, from class 00 to class 4. Class 00 gloves have the lowest voltage rating. The gloves you select for the task must be able to handle the maximum voltage ratings of the circuit being worked on. The gloves will have



colour coded labels which identify their class and the maximum voltages they are best suited for. Some manufacturers produce colour coded gloves.



Always select the right Class of glove for the job.

Leather over-gloves

Leather gloves are worn over insulating gloves to protect them against potential mechanical damage – for example, damage from chemical deterioration and cuts. While SM-EI rules state that leather over-gloves must be used where practical, other industry guides and codes of practice state that insulating gloves should always be worn with leather over-gloves. If in doubt, ask your supervisor.

Check gloves before use

When you are using rubber insulating gloves, make sure they:

- are within their test date
- are not damaged by rough surfaces or sharp objects
- are not overly exposed to heat or strong sunlight
- do not come into contact with oils or grease.







Regular testing of rubber insulating gloves is a safety requirement. Gloves must be electrically tested before their first use and retested on a regular basis. However, you must also visually check rubber insulating gloves immediately before each use. You must check that the test certification is current and you must also check for damage, to make sure there are no air leaks through cuts and weak spots. Checking for air leaks is best done by rolling the gloves up tightly, beginning at the cuff end, and noting if air escapes.



Any tiny hole or air pocket could let a current through.

Storing gloves

Store rubber insulating gloves in their own container, out of sunlight and away from objects which may damage them.

Visually inspecting gloves

Immediately before using rubber insulating gloves:

- check that the test certification is current
- check the gloves for damage to make sure there are no air leaks.

Testing gloves

Rubber insulating gloves should be sent to a test laboratory every six months for a voltage rating test. There must be a 'next due for test' test date displayed either on the glove or the container they're stored in.

Maintenance of gloves

Wash rubber insulating gloves using mild soap and water, then rinse well and air dry.



5.3 If you were doing a visual check, how would you determine if your rubber insulating gloves were appropriate for the work you were about to carry out?

Insulating ladders

Insulating ladders protect workers against electrocution when they are working in a potentially hazardous situation. For example, a line mechanic working with live lines would use an insulating ladder.

Ladders are commonly used when working on-site and there are many types of ladder.

- Wooden.
- Metal.
- Step ladder.
- Extension ladder.

You need to be able to correctly identify the best ladder to use for the job. For example,

the line mechanic working on live lines would need to check that the ladder was insulated. They would also need to check that the ladder they were going to select was the right height for the job.

It is important that you know how to check whether ladders are safe for use to avoid electric shock and to prevent falls — both of which can cause serious harm and death.

Inspecting ladders

Before use, check your ladder(s) to make sure:

- the rungs, feet and stiles are in good condition
- it is best suited for the job you're about to do.



If you aren't sure how best to check a ladder, ask your supervisor.

Maintenance of ladders

The following steps should be taken when caring for ladders.

- Your company should have a ladder check list, which outlines the items you need to inspect and record.
- Inspections must be completed by a competent person every 6-7 months.



Visit the Department of Labour website for a factsheet about working safely on ladders: www.osh.govt.nz/publications/factsheets/safe-working-ladders-stepladders.html.







Personal Fall Arrest Systems (PFAS)

Personal fall arrest systems (PFAS) are designed to support and hold you if you fall while working above or below ground (as in a pit).

EEA guidelines state that workers within the electricity supply industry must wear a full body harness and they must be trained to wear it.

Full body harnesses provide more protection than the older style lower body harnesses, which can no longer be used. A full body harness has the



addition of a front and back lanyard and allows you to move your working position while remaining attached to the structure. It keeps you upright if you fall and is more comfortable. When climbing on structures where free-fall is possible, lanyards must be attached to fall-arrest rated anchor points. A lanyard should limit your fall to set standards determined by EEA. This is generally 600 millimetres or less.



Before using any fall arrest, harnessing or safety belt equipment, check that it meets the most current safety requirements.

Inspecting PFAS

You, or a workmate, must inspect the equipment before and after each use. PFAS equipment must be completely inspected by a competent person every 6-7 months. Any parts with defects must be removed and either replaced or repaired.

Maintenance of PFAS

To care for your PFAS, wash with water and mild soap, rinse well and dry.





Sun protection

Over exposure to the damaging rays of the sun can result in skin cancers and possible melanoma, so when working outside you need to make sure you are well protected.

When preparing for outside work you should be wearing protective clothing, hat, sunglasses or tinted eye protection and sunscreen. Any one of those items will not fully protect you from the sun's rays – a combination is the best solution. When you consider protecting yourself from the sun keep in mind that:

- Concest

 Ultra

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 Let a cree

 SUNSCREEN
- excessive clothing may lead to discomfort and heat stress
- wide brimmed hats may restrict vision
- sunscreen should be applied to all uncovered skin.

Early detection of skin cancers is important. Early detection allows for prompt treatment of the conditions and prompt treatment gives better chance of a cure. Self-checking (looking for possible skin cancers on your body) should be done regularly. All of the body should be checked, as melanomas and other skin cancers can appear anywhere.

Inspecting for sun protection

Before heading off to do outside work, make sure:

- you are wearing protective clothing, hat, sunglasses or tinted eye protection and sunscreen
- · your sunscreen is within the use by date
- · sun protection clothing fits you comfortably.





5.4 This activity provides a brief summary of what you have read so far. Read the scenarios below and write the item(s) of PPE you would need to use for each one.

Scenario	PPE I need to use.
1 Working in a dirty, dusty environment.	
2 There are lots of bits of dust and chemicals in the air. Sometimes it is hard to breathe.	
3 Working on a construction site with the risk of falling objects.	
4 There is a loud noise coming from heavy machinery.	
5 Working outside on a very hot, sunny day.	
6 Working with electric circuits.	
7 Working at height.	

6. Be trained to choose and use PPE

Understand how to choose and use PPE correctly



You must be aware of the reasons for choosing types of PPE and understand how to use PPE correctly. Each electricity asset owner or network contractor has their own rules and ways of doing things when it comes to the choice, use and care of PPE. They will explain how to test and set up the equipment onsite.



Make sure you are trained to use PPE.

Make sure you are trained to use PPE

You should use suitable PPE where needed and make sure you have been trained to use it correctly. Each network company or contractor will have manuals that give you instructions on how to adjust, attach and use PPE to give you the greatest level of protection.

When fully trained, you should know:

- how to inspect PPE
- the correct ways to safely use PPE
- how to clean and store PPE
- how to report damaged PPE and request replacements
- the systems in use to protect employees and others from injury
- the emergency procedures to be adopted in the event of an accident or mishap.

Choose PPE to fit the job

Think about where you're working and the possible hazards present or likely when choosing the best PPE to use in an electrical environment.

Remember that whenever you are working on live circuits, you need 'whole body cover'. You must wear industry standard clothing that covers the whole body, including arms, legs and feet. Safety helmets and insulating gloves must also be worn.

Work on high voltage live line (HV Live) electrical equipment, circuits or systems has specific PPE requirements. Ask your supervisor about these and look at the industry code of practice NZECP 46 for further information.

See the table on the next page for examples of PPE to use in different work environments.

6. Be trained to choose and use PPE



Work environment	Example PPE requirement		
Work at ground or floor level	Boots, overalls, safety helmet (rubber insulating gloves when working on live circuits).		
Work above ground or floor level	Boots, overalls, safety helmet, eye protection, s protection, fall arrest harness (rubber insulating gloves when working on live circuits).		
Work below ground or floor level	Boots, overalls, safety helmet, eye protection, fall arrest harness (rubber insulating gloves when working on live circuits).		
Note that work above or below gropermits.	lote that work above or below ground or floor level may need special training and/o ermits.		

6.1 What PPE would you expect a person to use when working up a ladder, on a power pole, with a live circuit?

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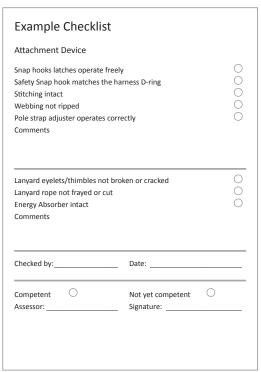
7. PPE reports

PPE reports are official records

If you're inspecting PPE and discover that there is a defect then you must make a report using the correct company form. These forms are official safety records and must be available for the Department of Labour officers to review when necessary.

The form will be different from company to company, but will have similar information to the one shown below.







7.1 Ask your supervisor for a copy of a blank PPE inspection form. Report the situation outlined below.

'You are about to start a job where you will need to wear a Personal Fall Arrest System (PFAS). You notice that one of the lanyards is looking worn and is beginning to come apart'.



8. Make connections

Think about how the information you have read applies to what you do at work. Read the questions and answer in the spaces provided.

Had you heard about the	Yes	No			
Health and Safety in Employment (HSE) Act 1992				\circ	
Electricity Act 1992			0	0	
Electrical (Safety) Regulations 2010			0	0	
List as many items of PPE t	hat you can think of.				
Item of PPE used in your workplace	Where is it used?	How is it cleaned?	Who is respo		
Have you ever had to comp	plete a PPE report on the j	ob?			
Yes	O No				
If yes, what was it about ar	nd what happened as a re	sult of the report?			

9. Answers to activities

5.1

	True	False
Rubber insulating gloves can be worn if they have cracks in them.		~
You can wear a baseball cap instead of a hard hat to protect your head.		~
PPE can be cleaned with mild soap and water.	~	
My own glasses will be enough to protect my eyes in the workplace.		*
You should not use ear plugs that have become hard.	~	
As long as I can hear myself I don't need ear protection.		~

^{*} Prescription glasses with plastic frames and lenses, and which have side protection, may be suitable.

5.2 AS/NZS 1801

5.3 Insulating gloves must have a coloured label which shows the voltage class and the maximum voltage the gloves can be used for. The label must show that the gloves are suitable for the circuit being worked on.

5.4

Scenario	PPE I need to use	
1 Working in a dirty, dusty environment.	Overalls Possibly eye protection and a respirator	
2 There are lots of bits of dust and chemicals in the air. Sometimes it is hard to breathe.	Eye protection Respirator	
3 Working on a construction site with the risk of falling objects.	Hard hat Boots	
4 There is a loud noise coming from heavy machinery.	Hearing protection Ear plugs, earmuffs	
5 Working outside on a very hot, sunny day.	Hat Sunscreen Sunglasses	
6 Working with electric circuits.	Rubber insulating gloves Possibly leather over-gloves	
7 Working at height.	PFAS Possibly insulating ladders	

9. Answers to activities

- 6.1 Boots, overalls, safety helmet, rubber insulating gloves, eye protection, fall arrest harness. If a person is working on a High Voltage Live (HV Live) circuit, they will need additional PPE. You might like to check with your supervisor about what PPE would be required for HV Live work.
- 7.1 Answer will depend on how your company's form is designed. Ask your supervisor to look over what you have written and check your answers against company policy.

