Government of **Western Australia**
Department of **Mines, Industry Regulation and Safety**
Building and Energy

Safe working guidelines and assessment for electrical apprentices

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Preface

This booklet covers basic electrical safety practices to be learned and followed by every electrical apprentice (apprentice).

It is provided as a guide to employers and apprentices to ensure apprentices have sufficient basic trade safety knowledge prior to being granted an electrician's training licence.

This booklet also forms part of the apprentice's reference material during the apprenticeship.

Every apprentice entering the electrical industry must be aware of the risks involved in working with electricity. **The danger is real**.

Safe working practices and procedures are an integral part of the electrical trade and must be the first skills learned.

A person carrying out electrical work is very safe when the appropriate practices and procedures are followed.

Note: This booklet uses the term "apprentice" for a person being trained even though the person may not have entered into a formal apprenticeship.

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Part A – Safe working guidelines for apprentices

1. Responsibilities

General

Employer and employee responsibilities for maintaining workplace safety are set out in Sections 19 and 20 of the *Occupational Safety and Health Act 1984*.

Employers have a duty of care to maintain a safe working environment for employees by providing information and training, safe work procedures, safety equipment and effective supervision.

Employees have a duty of care to ensure their own safety and to avoid any act or omission which adversely affects the safety of others during the performance of their work. Employees must cooperate with employers, follow safe work procedures and use protective equipment.

Licensing

Both the employer and the apprentice have the responsibility to ensure that an electrician's training licence is obtained before the apprentice carries out any electrical work.

At the completion of their apprenticeship, an apprentice must obtain an electrician's licence before they can carry out electrical work lawfully as a tradesperson.

Applications for both licences must be made to the Director of Energy Safety at the Department of Mines, Industry Regulation and Safety (DMIRS).

Employer responsibilities

As a prerequisite for an electrician's training licence, the employer must assess the apprentice's knowledge of safe working principles and practices (based on the information in these guidelines) and provide a formal assessment report to the Electrical Licensing Board. **Further details of the required assessment process are provided in Part B of this document.**

Employers must provide suitable training to ensure that apprentices maintain necessary safe work standards and achieve the required competencies.

Employers must establish and maintain an individual file/record of each apprentice's progress and performance. The records must include dates, successful performance of key work practices and other important details for future reference.

Employers should provide apprentices with, to the greatest extent possible, experience in a wide variety of electrical installing work types, to ensure that a broad range of electrical knowledge and skills has been obtained at the completion of training.

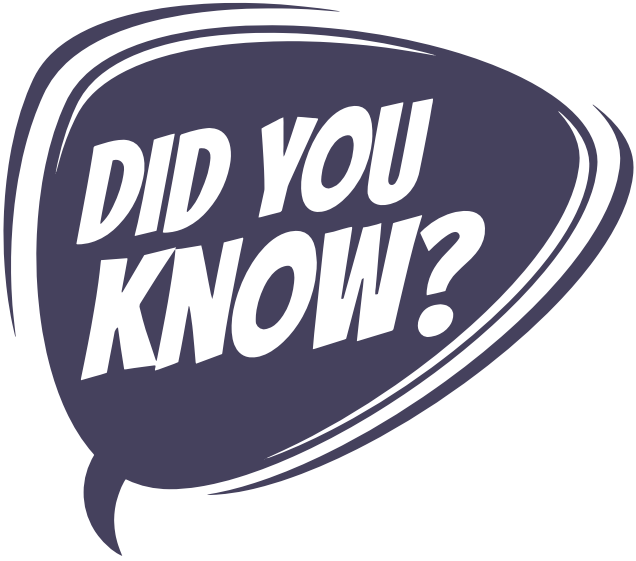
Apprentice responsibilities

An apprentice must work closely with the employer and supervising electrical worker to achieve a high standard of safety and workmanship. In particular, always follow instructions and safe working procedures provided by your supervising electrical worker.

An apprentice must not embark on tasks for which they feel unprepared or appear to be risky. If ever in doubt about anything, consult your supervising electrical worker.

Work standards

Supervising electrical workers are responsible for ensuring that apprentices learn the necessary work skills and for checking and testing all electrical work carried out by apprentices to ensure compliance with the Licensing Regulations. (This includes compliance with AS/NZS 3000 Wiring Rules and other technical standards listed in Schedule 2 of these regulations.)



2. Dangers of working with electricity

Electrical risks

The most common electrical risks and causes of injury are:

- **Electric shock** causing injury or death.
- **Burns** from arcing, explosion or fire.
- **Falls** from ladders, scaffolds or elevated work platforms (EWPs) as a direct consequence of an electric shock.
- **Poisoning** from toxic gases causing death from suffocation or chronic illness.
- **Fire** resulting from an electrical fault.

It only requires a very small failure of a work practice, such as a slip with a screwdriver or a dropped tool, for such accidents to occur.

Electric shock

All electric shocks must be avoided

All electric shocks are potentially fatal

Minor shocks could have resulted in death or injury had circumstances been only slightly different.

The human body is a conductor of electricity. A current will flow through body tissues when contact is made simultaneously with two objects which are at different voltage potentials. For example, if two terminals of different voltage potential are grasped, one in each hand, current will flow through the body from hand to hand. A similar effect will be produced if only the active is touched and the person is in contact with earth or conducting material in contact with earth.

Contact may also be made by tracking through or across a medium (e.g. wet areas), or by arcing.

Electric shock is the effect produced on the body, particularly the nervous system, by an electrical current. The effect varies depending upon the magnitude, path and frequency of the current and the duration of contact. (Even the briefest contact with electricity can have serious consequences.)

If the current magnitude is within a certain range and its path traverses the heart region, the normal rhythm of the heart can be

interrupted. In this state, known as ventricular fibrillation, the heart contracts randomly and cannot maintain blood circulation. Return to normal rhythm rarely occurs spontaneously and if the condition persists for more than a few minutes, the result is almost certain to be fatal.

Electric shock may also stop the heart completely and/or the victim's breathing.

"**Electrocution**" means death resulting from an electric shock.

Electricity supply systems typically operate at 230 volts AC phase to earth and 400 volts AC phase to phase. **A shock at these voltages can be fatal**. Hence, it is essential that adequate precautions are taken to ensure no person comes into contact with any 'live' electrical equipment or conductors.

A high voltage shock (of 1,000 volts or more) may inflict other forms of serious injury such as severe burns and organ failure.

Under normal circumstances, voltages below 50 volts AC generally are not harmful to humans. However, they must still be treated with respect, especially in wet or polluted areas.

Appendix 1 provides further details about the effects of electric shock on the human body.

Burns

Electrical arcing occurs when electrical insulation between conductors can no longer withstand the applied voltage or is bridged by conductive material.

Electricity flashovers/arcs can produce extreme temperatures, very high forces and toxic gases, and persons in the vicinity commonly suffer severe burns, permanent disfigurement or fatal injuries.

The risk of injury from arcing or explosion is extreme when high fault currents are present. This typically applies to low voltage circuits close to transformers or switchboards, where the electrical protection may only detect and interrupt an arcing fault slowly or not at all.

Arcing faults can occur at any time for a variety of reasons. However, they generally occur as a result of an external influence which, typically, may involve the actions of an electrical worker, for example during maintenance or energisation of equipment.

An arc flash hazard is effectively eliminated if work is undertaken on completely de-energised equipment and no switching operations are performed manually.

Falls

Falls from ladders, scaffolds or other elevated work platforms can occur as a direct consequence of an electric shock or arc blast, potentially resulting in serious injury or death.

Poisoning

Burning and arcing associated with electrical equipment may release various harmful gases and contaminants. Inhalation of these dangerous products may cause short term or chronic illness or result in death from suffocation.

Fire

Electrical workers may not be the only ones at risk. Faulty electrical equipment and poor standards of work can lead to fires that may cause injury or death to persons using the installation and property loss.

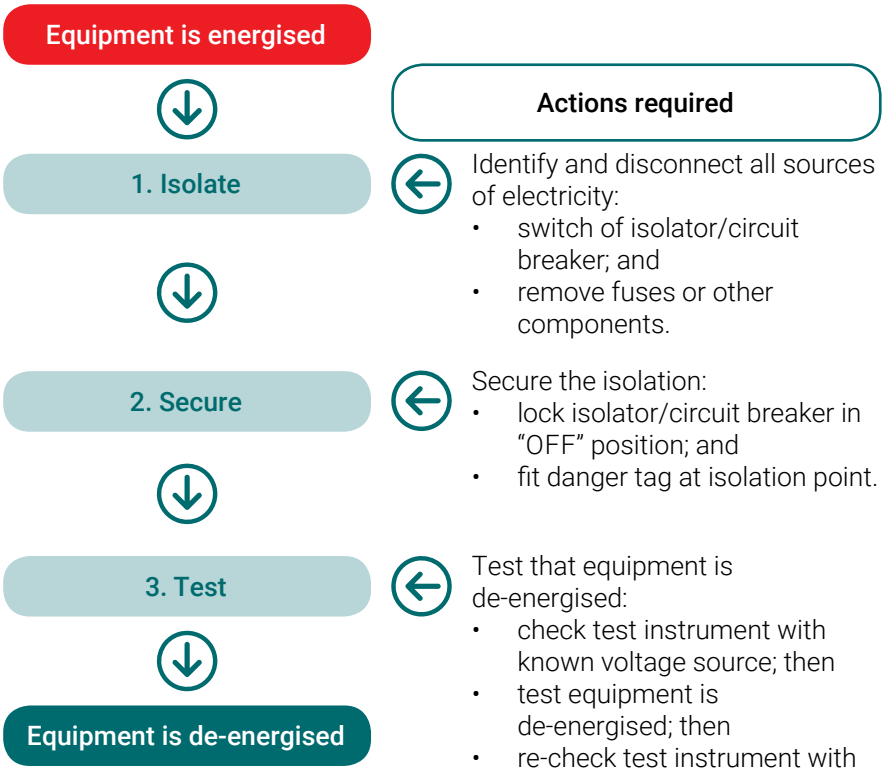
3. Electrical isolation and de-energisation of equipment

Before commencing any electrical work, the circuits or equipment to be worked on must be disconnected from all sources of electricity supply, the isolation points secured to prevent inadvertent re-energisation, and proven to be de-energised.

It is essential that all apprentices observe and take part in and, once adequately trained, perform (under direct supervision) the de-energisation procedure in order to gain a sound working knowledge of this essential safe working practice.

The key steps are summarised below for reference.

Essential steps for effective de-energisation of equipment



Securing the isolation

Locks

Where a facility exists to lock a switch in the "OFF" position, it must be used. Where a facility does not exist, a portable lock out device ("lock dog") must be fitted to the switch mechanism to prevent closing.

Locks are for the safety of personnel and:

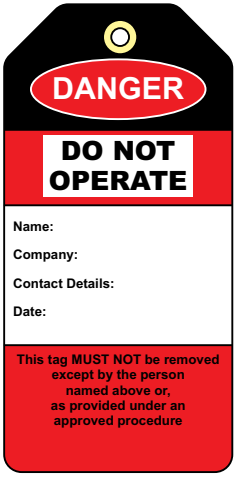
- they must be uniquely keyed so that they can be fitted and removed only by the person owning the lock;
- all persons involved in carrying out the work must fit their own lock at the same isolation point(s). This may require the use of a multi-lock security device;
- they must be clearly labelled (with a personal identification tag or Danger tag) to identify the owner and the nature of the electrical work being undertaken; and
- they must be removed upon completion of work or at the end of the shift (if the work will be continued by others, who must fit their own locks).

Danger tags

A Danger tag on an item of equipment is a warning to all persons that the equipment must not be operated, as lives may be placed in danger.

Danger tags are for the safety of personnel and:

- they must be attached in a prominent position at each isolation point;
- they must be fitted and removed only by the person who signed the tag;
- all persons involved in carrying out the work must fit their own Danger tag at the same isolation point(s); and
- they must be removed upon completion of the work or at the end of the shift (if the work will be continued by others, who must fit their own Danger tags).



Out of Service tags

This tag is used to identify appliances or equipment that are out of operation for repairs or alterations or are still in the process of being installed. While an Out of Service tag is fitted, the appliance or equipment must not be operated.

Out of Service tags are for the safety of personnel and security of equipment and must be:

- attached in a prominent position at the point of isolation of the appliance or equipment that is being worked on; and
- fitted and removed only by authorised persons.

4. Personal protective equipment (PPE)

General

The use of protective clothing and equipment is an essential part of working safely. Many electrical workers have avoided serious injury or death because of the clothes and other PPE they were wearing at the time.

Appropriate clothing and PPE provide some (limited) level of protection from:

- electric shock;
- flash burns resulting from an arcing fault; and
- mechanical impacts.

Limitations of PPE

PPE cannot be relied on as the sole risk control measure to provide full protection from electrical hazards.

PPE should be used in conjunction with other risk control measures and be considered as the final safety measure.

PPE must comply with the relevant legislation and Australian technical standards. In particular:

(1) The OSH Regulations provide general requirements for PPE used in Western Australia.

(2) AS/NZS 4836 (Section 9) provides a guide to the use of PPE for various types of electrical work.

(3) The Energy Networks Australia publication ENA NENS 09-2014 provides comprehensive guidelines for the selection, use and maintenance of PPE for electrical arc hazards.

Responsibilities

Employers must ensure their employees wear suitable everyday work clothes and footwear and must provide the necessary additional protective equipment to enable employees to carry out their work safely.

PPE provided to employees must comply with the relevant legislation and Australian technical standards.

Employers must ensure that employees are trained in the correct use and care of their PPE so that it provides the level of protection intended.

Apprentices (and all other employees) must wear suitable clothes and footwear at all times and use the additional protective equipment provided for the work in the correct manner.

Every electrical worker must ensure that:

- they always use ppe appropriate for the work undertaken;
- their co-workers also use the appropriate ppe; and
- they maintain their ppe in good condition and replace any defective items.

When you are issued with PPE, look for the relevant Australian/New Zealand Standard marking, rating, classification and certification expiry date.

Basic PPE

Information about basic (minimum) items of PPE is provided in the following sections, for easy reference and guidance.

Safety footwear

Safety footwear provides protection from:

- electric shock; and
- falling objects.

Safety footwear must:

- be non-conductive; and
- comply with technical standard AS/NZS 2210.

Safety glasses

Safety glasses provide protection from:

- flying objects caused by activities such as grinding and cutting; and
- electrical arcs (limited protection only).

Safety glasses must:

- have non-conductive frames; and
- comply with AS/NZS 1337.

Work gloves

Work gloves provide protection from mechanical impact in relation to tools, equipment and work materials.

Gloves must:

- have no conductive fasteners such as zips or studs;
- be made of durable material appropriate for the required work; and
- comply with technical standard AS/NZS 2161.

Safety helmets

Many work sites require safety helmets to be worn at all times. They provide protection from contact with:

- overhead wires/structures; and
- falling objects.

All helmets must be:

- non-conductive; and
- comply with AS/NZS 1801.

RCDs

RCDs on fixed or portable socket outlets provide additional **protection against electrocution** in the event of electric shock due to:

- inadvertent energisation of equipment being worked on; or
- a malfunction of portable electric tools and extension leads.

RCD protection must be provided in the workplace as required by:

- Regulation 3.60 of the OSH Regulations; and
- technical standard AS/NZS 3012, Electrical installations – Construction and demolition sites.

RCDs should be tested for correct operation before commencing work.

Protective clothing

Many work sites require full body cover protective clothing to be worn at all times. This is also required for certain types of electrical work, such as testing and fault-finding.

Clothing provides some (limited) level of protection from:

- electric arcing/flash burns;
- flying or falling objects; and
- electric shock.

Protective clothing for electrical work should cover the body completely and:

- be of material with properties equivalent to 185gsm 100 per cent cotton drill or better;
- have non-conductive and concealed buttons;
- have sleeves to wrist length; and
- have legs reaching to the footwear.

Additional care should be taken to ensure clothing is reasonably close fitting and remains fastened to avoid catching or entanglement. This is particularly important when working in the vicinity of any moving machinery or rotating equipment.

Additional PPE

For general work, other types of PPE commonly required are:

- hearing protection (earplugs or earmuffs); and
- respiratory protection (breathing masks).

Additional PPE should be considered for some types of electrical work, such as testing and fault-finding. Depending on the assessment of the risks involved, this may include:

- flame retardant clothing;
- insulated gloves;
- arc rated equipment – clothing, gloves, face shield, etc.;
- insulating covers/mats;
- low voltage (LV) rescue kit; and
- safety harness.

5. General safety tips

Metallic jewellery

Conductive jewellery such as wrist watches, rings, chains or piercings must never be worn while carrying out electrical work.

These items can become hazardous and introduce the risk of harm in many ways, including the following:

- Jewellery made of conductive metal may increase the risk of electrocution when working on or near energised electrical equipment.
- Metal jewellery will act as a heat-sink when exposed to high temperatures and can rapidly become extremely hot, resulting in a burn. Jewellery worn under clothing or behind a face-shield will act in a similar manner.
- Accidental contact with energised electrical equipment can rapidly weld metallic jewellery to the equipment and cause severe injury.
- Dangling, protruding or loose jewellery might catch or jam in equipment components or tools and can pull the wearer into moving parts, injuring the wearer and possibly others.
- Even close fitting items such as rings may present similar hazards in confined spaces.

Use of electric tools

Use RCD protection when operating any plug-in electric tool or equipment.

Worksite safety

Many work sites have their own site-specific safety requirements. All persons must abide by all additional safety requirements applicable to individual sites.

Job instructions

Ensure that you understand all instructions given by your supervising electrical worker. If in doubt, request further explanation, in writing if necessary.

All the safe work practices and procedures are worthless if they are not applied with skill and common sense.

IF IN DOUBT, ASK

6. Supervision of electrical apprentices

Electrical accidents and fatalities have occurred when apprentices were not adequately supervised. Such incidents are clearly preventable.

Effective supervision

The importance of **effective** supervision is recognised by the Regulation 50 of the Licensing Regulations. Apprentices require effective supervision for their safety and training and the safety of others.

The responsibility for determining the appropriate level of supervision rests with the employer and the supervising electrical worker. The key factors to consider are provided below.

(1) The type of work

Variations in the work environment, whether related directly to electricity supply or not, present many different circumstances and risks. Supervising electrical workers must assess these risks when determining safety requirements for the job at hand and the level of supervision appropriate for the apprentice. These include, but are not limited to:

- work type and location e.g. residential, commercial, mining, etc.;
- new construction or alteration/addition to an existing installation; or
- proximity to energised electrical equipment on the site and the voltage and maximum fault current of that equipment.

(2) Knowledge and skills of the apprentice

The supervising electrical worker must assess the technical knowledge and practical skills of the apprentice using information available from both academic and on-the-job training records.

The level of supervision needed for safe working must reflect this assessment.

(3) Competence of the supervising electrical worker

Employers must ensure that supervising electrical workers have the necessary competencies to provide effective supervision of an apprentice, including:

- being licensed to carry out the electrical work without supervision;

- appropriate technical knowledge, skills and experience in regard to the particular work to be performed;
- effective communication skills; and
- preferably, formal training in supervision of other workers.

Levels of supervision

Three different levels of supervision are defined in detail in Regulation 49D and are briefly summarised below:

(1) Direct supervision

"Direct" supervision applies where the apprentice requires constant guidance and monitoring by the supervising electrical worker to ensure the work task is carried out safely and correctly.

The supervising electrical worker must remain on the same work site as, and in close proximity to, the apprentice.

(2) General supervision

"General" supervision applies where the apprentice requires periodic guidance and monitoring to ensure the work task is carried out safely and correctly.

The supervising electrical worker must remain on the same work site as the apprentice and be readily available to provide guidance and assistance.

(3) Broad supervision

"Broad" supervision applies where the apprentice does not require ongoing guidance and monitoring while performing familiar tasks.

The supervising electrical worker does not need to remain on the same site as the apprentice but must, as a minimum, attend the work daily to provide initial instruction and to verify the electrical work has been carried out safely and correctly.

Determining appropriate levels of supervision

The level of guidance required by an apprentice can be expected to diminish gradually over the course of the apprenticeship, as increasing competence is attained and demonstrated by the apprentice.

However, the appropriate level should be applied at any time based on the supervising electrical worker's assessment of the apprentice's competence to perform each task. For example, a task being performed for the first time or in an unfamiliar environment in the final year of training may initially require direct supervision for that particular task.

The following table provides guidance to employers and supervising electrical workers on appropriate **minimum** levels of supervision of apprentices at different stages of training and for different work types **(de-energised only)**, subject to assessment by the supervising electrical worker:

Type of work (de-energised only)	Apprentice training year	Recommended minimum supervision level
New electrical installations *(not connected to electricity supply)*	1st 2nd 3rd 4th or final	General General Broad Broad
Maintenance, alterations and additions to existing electrical installations *(isolated and proven de-energised by supervising electrical worker)*	1st 2nd 3rd 4th or final	Direct General General Broad
Workshop assembly and maintenance of electrical equipment *(not connected to electricity supply)*	1st 2nd 3rd 4th or final	General General Broad Broad
Tag and lockout procedure on de-energised installations and equipment *(isolated and proven de-energised by supervising electrical worker)*	1st 2nd 3rd 4th or final	Direct General General Broad
Testing and fault-finding on de-energised installations and equipment *(not connected to electricity supply or isolated and proven de-energised by supervising electrical worker)*	1st 2nd 3rd 4th or final	Direct Direct General General

The levels of supervision applied in practice may vary from the recommended minimum levels subject to a diligent assessment by the supervising electrical worker of the nature of the work, the specific circumstances and risks, and the competence of the apprentice to perform the task.

The flowchart in Appendix 2 illustrates the appropriate steps for the supervising electrical worker to carry out such an assessment.

De-energisation of equipment – apprentice to verify

From the start of workplace training, apprentices should, after de-energisation of the circuit or equipment by the supervising electrical worker and prior to commencing work, always:

- participate in the tag and lockout procedure by applying personal tags and locks; and
- 'TEST BEFORE YOU TOUCH' – personally verify, by electrical testing, that the circuit or equipment is de-energised.

The appropriate level of supervision for an apprentice performing this task is shown in the previous table.

Restrictions on apprentices working on or near energised equipment

Work on or near **energised** electrical circuits and equipment by any electrical worker is prohibited by the Licensing Regulations except in certain prescribed circumstances and subject to performing a detailed risk assessment and formal documentation of a safe work method statement.

Testing and fault finding

The Licensing Regulations permit an electrical apprentice to carry out isolation, testing and fault finding on energised equipment in the following **strictly limited circumstances**, **in combination**:

- **only** in the **final year of training**;
- **only** if assessed by the supervising electrical worker as being **competent** to perform the task safely; and
- **only** under **direct supervision**, with the supervising electrical worker in close proximity to the apprentice for the duration of the task.

In all cases, the supervising electrical worker is responsible for the risk assessment, safe work method statement, instruction and direct supervision of the apprentice and final verification and testing of the work.

The limited circumstances in which energised work is permitted and the strict precautions that are required to maintain safe working conditions are prescribed in the:

- Occupational Safety and Health Regulations 1996 (OSH Regulations);
- Electrical (Licensing) Regulations 1991;
- Code of Practice for Persons working on or near energised electrical installations (published by Building and Energy); and
- The Commission for Occupational Safety and Health's Guidance note - Work in roof spaces 2018.

Work in roof spaces – special precautions required

The OSH Regulations generally prohibit workers entering the roof spaces of buildings unless the electrical installation is de-energised.

However, after isolating the network supply and in-built energy sources (such as direct or inverter connected generators and batteries) to the extent that isolation facilities permit, energised cables and equipment may still be present on roofs, in ceiling spaces and wall cavities, associated with:

- network service apparatus; and
- on site generators or batteries.

Hazardous voltages may also still exist at terminals within the switchboard and other electrical enclosures.

When working on alterations to existing electrical installations, (particularly those with in-built energy sources), extra care is required to ensure that workers are not exposed to the risk of contact with energised wiring or equipment even when the circuit(s) to be worked on have been de-energised.

Before commencing work

Before an apprentice commences any electrical work the supervising electrical worker must:

- be confident that the apprentice is fit for work;
- ensure there are no exposed live parts and the electrical equipment is de-energised and safe to be worked on or near;
- clearly instruct the apprentice on which tasks he/she is expected to do and which ones he/she must not be doing until he/she is instructed on how to do the tasks. Confirm the apprentice understands the instructions;
- advise the apprentice which level of supervision applies to the work and confirm these apprentice understands the limitations;
- ensure that the apprentice is equipped with the necessary PPE and tools and understands how to use them correctly; and
- where the equipment has been de-energised to allow work to be carried out on or near it, ensure that the apprentice:
    - has applied their personal lock and danger tag at the isolation point(s); and
    - has verified by an electrical test that the equipment is de-energised – TEST BEFORE YOU TOUCH.

7. Safe working practices

Isolation and safe working procedures are an essential part of every electrical worker's job and, if practiced correctly, can prevent injury or save a life.

As an apprentice, your supervising electrical worker is required to explain the correct work procedures to be followed and you need to clearly understand these before you start work.

Before starting work

- Plan and discuss the job with your supervisor – assess any safety risks.
- Identify the means of safe electrical isolation.
- Ensure that you receive explicit instructions about the work (written if necessary) from your supervising electrical worker.
- Check that your work mates know rescue and resuscitation techniques.
- Ensure that you have the appropriate PPE and it is in good condition. PPE will provide only limited protection from electrical risks such as electrical shock, arc flash and arc blast.
- Check that you have the appropriate tools for the job.
- Check that the power supplies for any plug-in tools or equipment are RCD protected – regularly perform an operational check of an RCD.
- Take care and think about what is to be done.
- Check if the upstream electrical protection has a maintenance setting that enables an immediate circuit trip if any fault occurs.
- Isolate the electrical equipment or circuit by removing the fuses and/or switching off the circuit breaker.
- Secure the isolation by fitting personal locks and "Danger" or "Out of service" tags (as applicable) at the point(s) of isolation.
- Erect safety barriers where required.
- Cover adjacent live apparatus with insulating barriers where required to do so by the risk assessment.
- **TEST BEFORE YOU TOUCH – Always test for no voltage before starting work – always check test instruments before and after every test.**
- Ensure test instruments are fit for purpose and adequately rated (e.g. Category IV etc.).

- Use the correct earthing equipment.
- Start work only when authorised to do so.

Remember, if in doubt about anything, ask your supervising electrical worker for advice before starting work.

When working

- Always wear your PPE.
- Use only the correct tools and safety equipment for the work.
- Use safety observers where required.
- Never put yourself or others at risk.
- Never rely on your memory about work conditions – if unsure about anything, check visually or re-test.
- Disconnect conductors in order – the active first, the neutral second and the earth last.
- Connect conductors in order – the earth first, then the neutral and the active last.
- Always check the isolation points and re-test before resuming work after a break – TEST BEFORE YOU TOUCH.

On completion of work

- Check that tools are not left on or in the job.
- Remove personal earthing equipment (where applicable).
- Notify all personnel that the equipment will be energised.
- Remove your "Danger" or "Out of Service" tags and locks.
- Remove and store all safety barriers and other equipment.
- Relinquish your access or vicinity work permit (if relevant).
- Once re-energised, confirm the equipment is operating correctly, including restoration of normal electrical protection settings (if applicable).

Safety practices

- Keep a well maintained first aid kit handy.
- Know the electric shock rescue and resuscitation procedure.
- Know where fire extinguishers are located at each work site and how to operate them.
- Know the correct type of fire extinguisher to use for the various types of fires.
- Keep your workplace clean and tidy.
- Report all electrical accidents to your employer (who must report the accident immediately to the relevant network operator).

Tools

- Use the correct tools for the job at hand.
- Regularly check, clean and maintain all tools and recertify (where applicable).
- Use RCDs when using plug-in electric tools.
- Use insulated ladders.
- Use approved safety harnesses and other equipment.
- Use non-conducting tape measures when working on or near electrical equipment.

8. Rescue and resuscitation

All electrical workers and apprentices should have current rescue and resuscitation skills.

All electrical workers and apprentices should receive ongoing training in rescue and resuscitation procedures by periodically attending a recognised course from a reputable training provider (recommended annually).

The following information is provided as a quick reference only.

Isolate the electricity

The first critical step before attempting to assist a casualty after an electrical accident is to check for danger to yourself, the casualty and bystanders. In particular, ensure that the source of electricity is isolated before anything else is attempted (Part of Step D in the resuscitation procedure).

Low voltage (230/400): Immediately switch off the electricity. If this is not practicable, pull or push the casualty clear of the electrical contact using dry non-conducting material (wood, rope, clothing, plastic or rubber). Do not use metal objects or anything moist.

High voltage: Wait until disconnection of the electricity is confirmed.

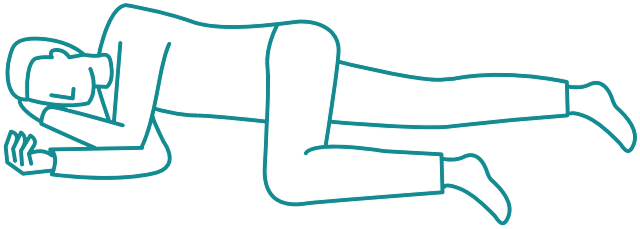
Basic principles of first aid

The purpose of giving first aid to a casualty is to:

• Preserve life	Check for danger to yourself, the casualty, bystanders.
• Prevent further injury	If possible, leave the casualty where they are and render first aid. Move the casualty only if necessary to save their life or prevent further injury.
• Promote recovery	Help the casualty to breathe, stop bleeding, get trained help, make the casualty comfortable.
• Protect the unconscious	Clear and open the airway, turn the casualty into the recovery position.

Recovery position

A casualty should be placed into the recovery position when they are unconscious and breathing and the person administering first aid is waiting for medical assistance to arrive.



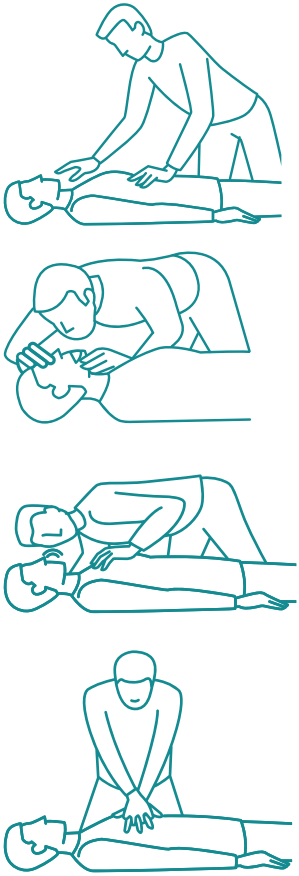
Emergency resuscitation (CPR)

The method of emergency life support is Cardiopulmonary Resuscitation, more commonly referred to as "**CPR**".

Basic Life Support

- **D** — **Dangers?**
- **R** — **Responsive?**
- **S** — **Send** for help
- **A** — Open **Airway**
- **B** — **Normal Breathing?**
- **C** — Start **CPR**
  30 compressions: 2 breaths
- **D** — **Attach Defibrillator (AED)**
  as soon as available and follow its prompts

Continue CPR until responsivenness or nomal breathing return



The recommended emergency procedures are sourced from the Australian Resuscitation Council Guideline 8 - Cardiopulmonary Resuscitation (as published in January 2016).

Providing 30 compressions (at approximately 100/min) and giving two breaths (each given over one second per inspiration) should result in the delivery of five cycles in approximately two minutes.

Details of the "DRS ABCD" steps in the CPR method are subject to variation from time to time. Persons trained in resuscitation should refresh their knowledge of the procedures on a regular basis (recommended annually).

Further information and training in first aid and resuscitation procedures is available from recognised training providers.

9. Reporting and investigation of electrical accidents

The Licensing Regulations require the reporting and investigation of electrical accidents, including electrical shocks.

Reporting

- Electrical workers and apprentices must report all electrical accidents (including minor shocks) to their employer.
- When an electrical accident is reported, the employer is required to notify the relevant network operator about the incident.
- In remote areas of Western Australia where there is no network operator, an electrical accident must be reported to Building and Energy. This should be done by telephoning:

FREECALL 1800 678 198 (all hours)

This phone number is for use within Western Australia only.

- The employer must also notify WorkSafe about electrical accidents as prescribed in Section 23I(3) of the Occupational Safety and Health Act and Regulation 2.4 of the OSH Regulations.

Investigation

Electricity network operators and Building and Energy investigate all electrical accidents, including electric shocks. In this way, the cause of the incident can be determined and actions can be taken to minimise the risk of a recurrence.

10. Personal safety is your priority

Your safety and the safety of other workers overrides **all** other work considerations such as cost of the work, time, lost production or customer service standards.

Remember that if you always follow the safe work practices you are taught and don't take risks and short cuts, you will stay safe while carrying out electrical work.

Part B – Assessment and testing of apprentice's knowledge of workplace safety

Assessment guidelines

The Electricity (Licensing) Regulations 1991 (Licensing Regulations) require apprentices to be assessed as having adequate knowledge of safety principles and practices prior to obtaining an electrician's training licence:

> Regulation 22(3) states: *A licence endorsed as an electrician's training licence shall not be issued to a person unless the Board is satisfied that the person has been assessed as satisfactory in relation to safety in the manner approved by the Board.*

The employer is responsible for:

- providing the apprentice with a copy of this booklet;
- carrying out an interview to assess whether the apprentice:
    - understands his/her and other's safety responsibilities as detailed in this booklet, including:
        - apparel and personal protective equipment (required to perform the job safely); and
        - supervision requirements (work he/she can carry out without supervision and when he/she requires supervision).
    - has a sound knowledge of rescue and resuscitation procedures.
- supervising a written test (Apprentice Safety Assessment Test) of the apprentice or arranging to have an independent assessor carry out the test;
- completing the Apprentice Safety Assessment Report Form and providing it to the Electrical Licensing Board; and
- ensuring that the apprentice attends a basic course (minimum) in CPR by a reputable service provider within **one** month of engagement. Relying on gaining this essential knowledge from this booklet or other means is not sufficient.

Eligibility to conduct interview and test

The person conducting the assessment (the assessor) must be an electrician, licensed to carry out the electrical work for which the apprentice is to be indentured, without supervision.

Assessment

The assessor will evaluate the responses to the test questions. A score of at least 80 per cent correct answers must be achieved, with satisfactory responses in the general interview, to enable the assessor to assure the Electrical Licensing Board that the apprentice's knowledge of trade safety justifies the issue of an electrician's training licence.

If the assessor is confident that the apprentice meets the requirements (based on the results of the interview and the written test), the Assessment Report is to be completed.

On the other hand, if the assessor is not confident about the apprentice's competence, the apprentice should be given more time and instruction and then be reassessed.

The assessment test and assessment report form are available at www.commerce.wa.gov.au/publications/apprentice-safety-assessment-guidelines-test-and-report

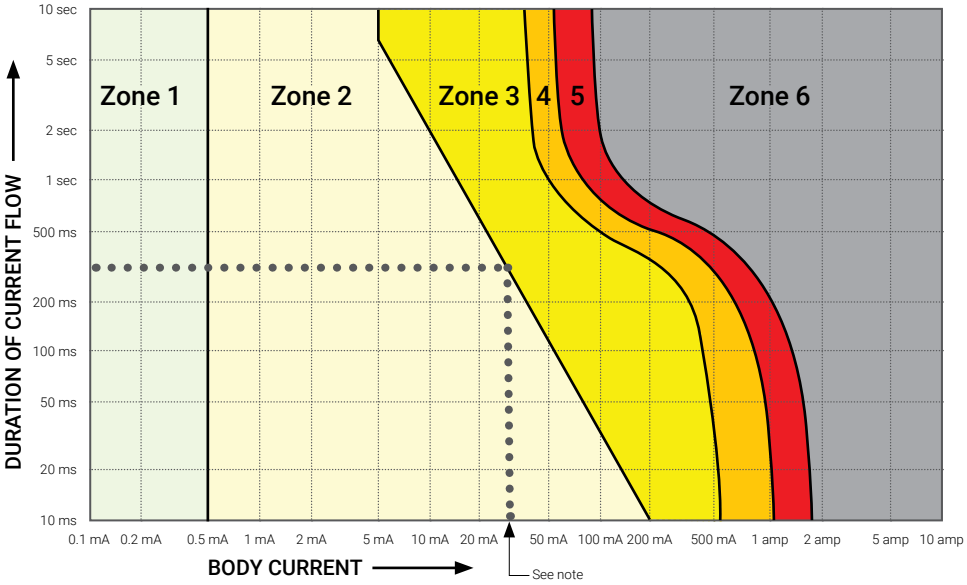
Appendix 1 – Effects of electric shock

The likely **physiological effects** of electric shock on a healthy adult are illustrated in the following figures[1], for variations in the amount of electric current flowing through the body and time of exposure:

<table>
<tr><th>Zone</th><th colspan="2">Effects of electric shock on the human body</th></tr>
<tr><td>1</td><td colspan="2">Perception possible but usually no ‘startled’ reaction</td></tr>
<tr><td>2</td><td colspan="2">Perception and involuntary muscular contractions likely but usually no harmful effects</td></tr>
<tr><td>3</td><td colspan="2">Strong involuntary muscular contractions.
Difficulty in breathing.
Reversible disturbances of heart function.
Immobilisation may occur.
Effects increasing with current magnitude.
Usually no internal organ damage expected.</td></tr>
<tr><td>4</td><td rowspan="3">Patho-physiological effects may occur:
• cardiac arrest
• breathing stops
• burns
• internal organ damage
Injuries may result in DEATH.</td><td>Probability of ventricular fibrillation up to about 5 per cent</td></tr>
<tr><td>5</td><td>Probability of ventricular fibrillation up to about 50 per cent</td></tr>
<tr><td>6</td><td>Probability of ventricular fibrillation above 50 per cent</td></tr>
</table>

[1] Adapted from AS/NZS 60479.1:2010 ‘Effects of current on human beings and livestock – General aspects’

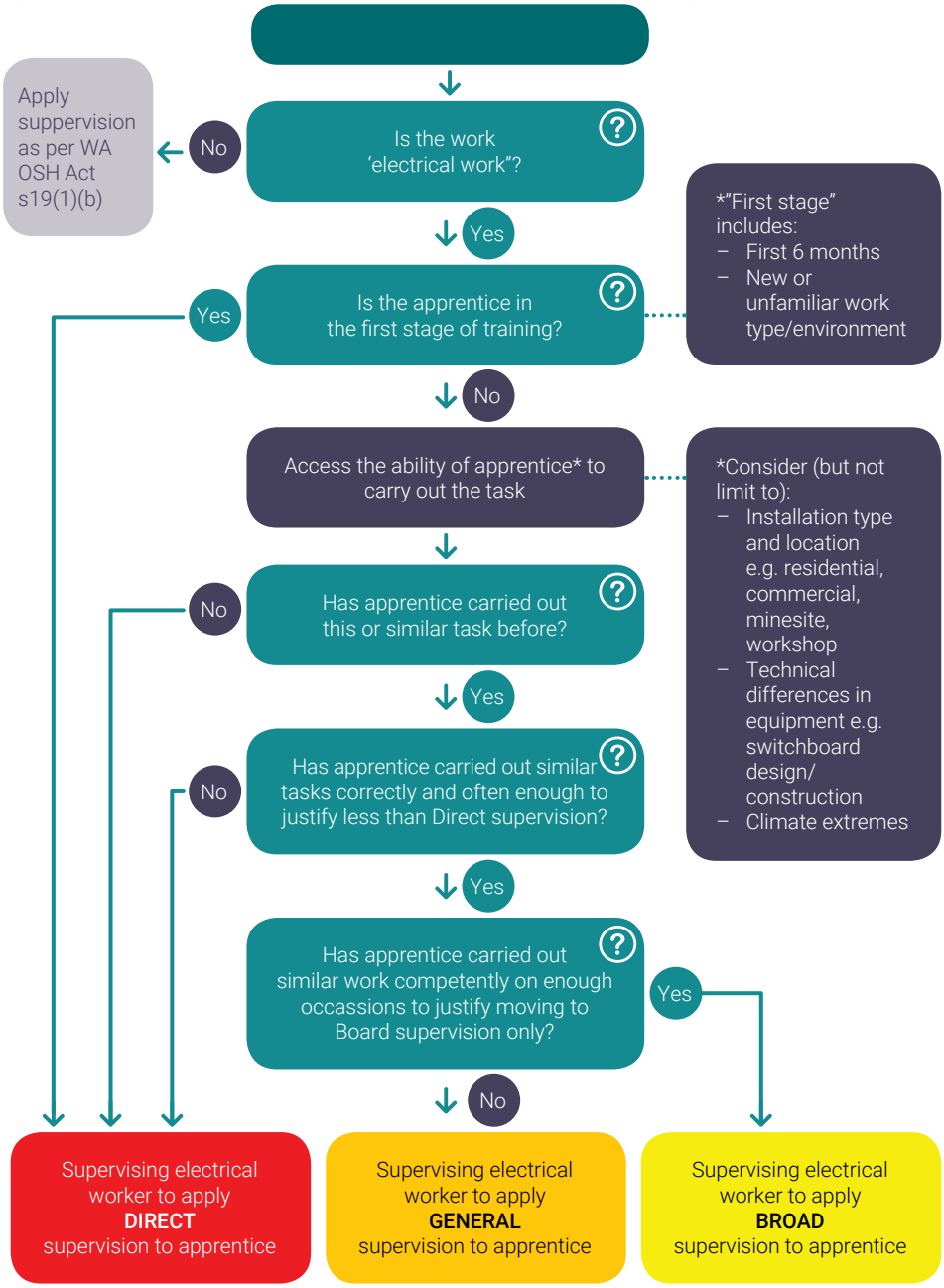
Effects of electric shock on the human body



Note: The standard 30 mA RCD operates within 300 milliseconds for a circuit current imbalance of 30 mA, providing effective protection against potentially lethal high body currents (Zones 3, 4, 5 and 6).

Appendix 2 – Assessing the appropriate level of supervision for an apprentice (de-energised work only)

(See recommended minimum supervision levels on Page 8)



Feedback on any aspect of this document is encouraged.
Comments and suggestions may be sent to:

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Online
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Email: energysafety@dmirs.wa.gov.au

Energy incident notification (24 hours)
1800 678 198

National Relay Service: 13 36 77
If you require the services of an interpreter, contact the Translating and Interpreting Services (TIS) on 13 14 50 and ask for connection to Building and Energy on 6251 1900. This publication is available on request in other formats to assist people with special needs.

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