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ELECTRICITY ACT 1945
ELECTRICITY (LICENSING) REGULATIONS 1991

CODE OF PRACTICE FOR PERSONS WORKING ON OR NEAR ENERGISED ELECTRICAL INSTALLATIONS

Preface

Energy*Safety* has developed this Code of Practice for Persons Working on or Near Energised Electrical Installations (the Code).

The Code commences on the day the *Electricity (Licensing) Amendment Regulations (No. 2) 2017* commences.

Compliance with the Code is made **mandatory** by Regulation 49(1) of the *Electricity (Licensing) Regulations 1991*.

A downloadable copy of the Code is available from Energy*Safety*'s website at—

www.energysafety.wa.gov.au .

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November 2017

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

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CODE OF PRACTICE FOR PERSONS WORKING ON OR NEAR ENERGISED ELECTRICAL INSTALLATIONS

1. Scope of this Code

Regulation 55 of the *Electricity (Licensing) Regulations 1991* prohibits electrical work on or near an energised part of an electrical installation except under certain specific situations prescribed in sub-regulation 55(2).

This Code prescribes additional requirements for those persons who will be authorising or carrying out electrical work on or near energised electrical installations. It is to be read in conjunction with the *Occupational Safety and Health Regulations 1996* (OSHR), in particular Part 3 Division 6.

Compliance with the Code may be achieved by following another method utilising sound risk management practices, if it provides an equivalent or higher standard of electrical safety than the Code.

The Code applies to all electrical work on low-voltage and high-voltage installations. It does not apply to work on extra-low voltage[1] electrical equipment.

Regulation 55 does not apply to a network operator's network but does apply to electrical installations that are not part of the network operator's network such as general power and lighting in switchyards and associated control buildings.

This Code has been made in accordance with Part VI of the *Interpretation Act 1984* and has the power of subsidiary legislation. It is referenced in regulation 49(1) of the *Electricity (Licensing) Regulations 1991*.

2. Definitions

The following terms used in this Code have the same meaning as those terms in the *Electricity (Licensing) Regulations 1991*—

de-energised has the meaning given in regulation 3;

electrical installation has the meaning given in regulation 3;

energised has the meaning given in regulation 3;

electrical work has the meaning given in regulation 4A;

near has the meaning given in sub-regulation 54A(2);

written form includes retrievable electronic records.

The term ***competent person*** used in this Code has the meaning given in Regulation 1.3 of the *Occupational Safety and Health Regulations 1996*—

"***competent person***, in relation to the doing of anything, means a person who has acquired through training, qualification or experience, or a combination of those things, the knowledge and skills required to do that thing competently."

3. Responsibilities

The following persons are collectively responsible for ensuring that electrical work is carried out under de-energised conditions in all circumstances except as permitted by Regulation 55—

1. A person carrying out electrical work;
2. An electrical contractor or in-house electrical installing work licence holder;
3. A person who, at a workplace, is[2]—
    - an employer;
    - the main contractor;
    - a self-employed person;
    - a person having control of the workplace; or
    - a person having control of access to the workplace.

[1] Voltages that do not exceed 50 volts a.c. or 120 volts ripple-free d.c.
[2] See *Occupational Safety and Health Regulations 1996* for the definition of the listed persons.

4. Work on electrical installations—de-energised work

4.1 Procedure for de-energising

The most effective safety control measure is to de-energise the relevant part of the electrical installation and to ensure the work is not carried out near any part of the installation that remains energised.

Before any electrical work is undertaken, the responsible person must ensure the electrical installation or the relevant part of the electrical installation to be worked on—

a. is tested by a competent person to ascertain whether or not it is energised; and

b. if it is found to be energised, is de-energised by a competent person.

To effectively de-energise the electrical equipment or circuit to be worked on, the following procedural steps should be taken in the order shown—

(1) Identify the circuit to be worked on and verify it is the correct circuit by testing i.e. do not rely on labels or other means.

(2) Disconnect all supplies of electricity to the installation, or that part of it to be worked on, by opening the necessary switches and/or removing fuses and links. There might be multiple network connections, standby generators, solar panels, batteries, back-up supplies or uninterruptable power supplies from other parts of the installation.

(3) If work will be carried out near other energised parts of the installation, disconnect the electricity supply to these parts of the installation as well or provide barriers to prevent contact with the energised parts.

(4) Fit locks and appropriate tags at the point(s) of isolation to ensure the equipment being worked on cannot be accidently re-energised.

(5) Test between all exposed conductors and a known earth to prove they have been de-energised.

The safe work principle 'TEST BEFORE YOU TOUCH' must be applied at all times. Even if the electricity supply has been disconnected, it must be assumed that all conductors and electrical components are energised until they have been proven de-energised.

(6) Where determined as necessary following a risk assessment, bond exposed conductors together and connect to earth using appropriately rated earthing equipment.

(7) Identify the safe area of work clearly by erecting barriers or warning signs.

A detailed procedure for effective electrical isolation of low voltage electrical installations is provided in Section 3.2 of AS/NZS 4836:2011 'Safe working on or near low-voltage electrical installations and equipment'. These principles, modified as necessary, may be similarly applied to high voltage electrical installations.

4.2 Risks when fault finding and testing on de-energised equipment

During electrical testing of de-energised equipment, a considerable build-up of capacitive charge can occur and remain on the equipment following completion of the testing.

Following electrical testing, the equipment should be proven to be de-energised before any further work is performed. (TEST BEFORE YOU TOUCH)

5. Carrying out electrical work on or near energised electrical installations

A person carrying out electrical work or causing electrical work to be carried out, on or near an exposed energised part of an electrical installation commits an offence unless the person carries out the work or causes the work to be carried out under regulation 55.

The flowchart in Appendix B can be used to assist with the decision-making process.

A person or business requiring electrical work to be carried out may provide operational reasons appearing to justify energised electrical work. Requiring electrical work to be carried out while the equipment is energised when it could be avoided places an onerous responsibility on the person or business to manage the risks. Should an incident occur as a result of carrying out energised electrical work, the person or business is at risk of being found not to have provided a safe workplace. This could contravene the primary duty of care under the *Occupational Safety and Health Act 1984*.

5.1 Summary of requirements before electrical work is carried out on or near energised electrical installations

Regulation 55(2) requires that, before electrical work is carried out on or near an energised part of an electrical installation, the following measures must be taken—

(a) A risk assessment is to be undertaken by a competent person familiar with the type of work to be carried out; and

(b) The competent person is satisfied that the requirements of regulation 55(2)(b) are met; and

(c) A safe work method statement (SWMS) for the work has been prepared in accordance with regulation 3.143(4) of the OSHR; and

(d) Suitable personal protective equipment and safety equipment is used by the person carrying out the work.

5.2 Risk assessment

The risk assessment must be undertaken by a competent person. The risk assessment must—

- identify the electrical and other hazards to which a person doing the work is likely to be exposed and assess the risk of injury or harm;
- be designed to check compliance with the legislative requirements;
- be in written form; and
- determine the risk level and include appropriate risk control measures to be implemented.

A copy of the risk assessment must be kept for a period of 2 years after all the work to which it relates is completed.

5.2.1 Typical risks when carrying out electrical work on or near energised electrical installations

Typical risks to be considered are—

- electric shock, if contact is made with exposed energised parts or due to high or low voltage flash-over;
- explosion (arc blast) or flashover, for example if a metal tool or fixture is dropped onto energised busbars causing a short circuit;
- exposure to high-temperature parts causing burns to bare skin; and
- electrical fires caused, for example, by allowing moisture or dust to enter electrical equipment.

The following factors must be taken into account in assessing risks—

- type of work carried out and tools or equipment to be used;
- proximity of the work to energised parts;
- maintenance of minimum safe egress clearances;
- types of tools and equipment used in the work, for example the conductive properties of tools;
- condition of the equipment i.e. such as any degradation from its original condition; and
- environmental conditions such as confined space, unfavourable weather, wet surfaces or wet PPE, or working at height.

5.2.2 Hazards indirectly caused by electricity—conductive materials

Persons can be exposed to electrical hazards, including electric shock, arcing and explosion, without directly contacting exposed energised parts of electrical installations.

Other conductive materials can provide current paths for the electric shock, fault current or both.

All materials, including gases and liquids, must be regarded as conductive unless proven otherwise.

Particular care must be taken when exposed energised parts are near earthed situations.

The electric shock path to earth can be via conductive materials, such as concrete or timber with a high moisture content, or water. For example, ladders that are damp or dirty might become conductive and create a potential hazard.

When working near exposed energised parts or working on energised installations, the tools and equipment used must be non-conductive or insulated and rated for the type of work being carried out. Examples include—

- torches;
- telescopic devices;
- rulers and tape measures;
- insulated hand tools, for example screwdrivers, pliers, cable cutters, spanners and crimpers;
- insulating mats and barriers; and
- power tools.

Workers must be trained in the use of such tools and the relevant equipment.

5.2.3 Arc Flash Hazard

An arc-flash can occur when electrical insulation between conductors can no longer withstand the applied voltage or is bridged by conductive material. Arcing faults can generate extreme forces and temperatures with serious burns or fatal injuries a common consequence. Arcing fault incidents can also occur when equipment is being energised or de-energised.

If work is undertaken on a completely de-energised switchboard and no switching operations are to be performed manually, an arc flash hazard would not be present.

Whenever work is undertaken near energised parts of an installation, the risk of arc-flash must form part of the risk assessment. The risk assessment must consider, but not be limited to—

(a) Fault level;

(b) Specific arc flash containment within the design of the equipment;

(c) Likely direction of an arc blast; and

(d) Inappropriate or out-of-date protection settings.

5.2.4 Risks when fault finding and testing on energised equipment

The risk of electric shock, electrocution, arc flash, arc blast and consequential burn injuries exists when performing fault-finding or testing on or near exposed energised conductors or conductive parts.

To manage this risk, the same precautions taken for any other work on or near energised electrical equipment apply, namely—

- Before commencing the work—
  - o the associated risks shall be assessed and documented; and
  - o the risk control measures shall be documented in the SWMS and implemented;
- Workers must be appropriately trained and competent in the application of test procedures and in the use of test instruments on energised equipment (refer section 5.5.1); and
- Workers must wear the appropriate, correctly rated PPE for the work to be performed as determined by the risk assessment (refer section 5.5.2).

5.2.5 Further guidance on the Risk Assessment Process

The following documents provide further guidance on how to prepare a risk assessment—

- AS/NZS ISO 31000:2009—Risk management—Principles and guidelines;
- SA/SNZ HB 436:2013—Risk management guidelines—Companion to AS/NZS ISO 31000; and
- The Commission for Occupational Safety and Health's Guidance note: General duty of care in Western Australian workplaces.

5.3 Assessment by the competent person

The competent person must assess the work to be undertaken and be satisfied that—

(1) There is no reasonable alternative to carrying out the work while the part of the electrical installation is energised.

For the work to proceed, he/she must ascertain that—

(a) the work could not be carried out effectively if the installation was de-energised; or

(b) it is necessary that the part of the installation be energised because carrying out the work by alternative means would put the health or safety of one or more persons in imminent and significant danger; or

(c) it is not possible to test, measure the performance of or detect or locate faults or defects in the electrical installation or the part of the installation, unless that part of the installation is energised; and

(2) The risks identified by the risk assessment after implementation of the risk control measures are as low as reasonably practicable; and

(3) The work can be carried out safely.

5.4 Safe work method statement (SWMS)

Before any electrical work is undertaken on or near an energised part of an electrical installation, a SWMS must be prepared by a responsible and competent person.

The SWMS must comply with Regulation 3.143 of the OSHR.

The SWMS documents a process for identifying and controlling health and safety hazards and risks. It might also incorporate a risk assessment.

The SWMS must—

- be developed in consultation with relevant workers;
- identify the electrical work;
- specify the hazards associated with that electrical work and risks associated with those hazards;
- describe the measures to be implemented to control the risks;
- describe how the risk control measures are to be implemented, monitored and reviewed, and may include the risk assessment prepared for the relevant work;
- be in writing. It must be written in a way that makes it readily understandable by the workers who are to use it;
- be kept up to date;
- must be revised if a decision is made to change relevant safe work procedures at the workplace;
- to the extent practicable, be reviewed by a different competent person;
- be readily accessible to any worker who is to carry out the electrical work covered by the statement; and
- must be kept for a period of 2 years after all the work to which it relates is completed.

A sample template of a suitable SWMS is provided in Appendix A of this Code. [Note: this is provided for guidance only and is not intended to duplicate or replace existing risk management systems (where these are effective) used by electrical workers.]

5.5 Tools and equipment

Insulated tools and equipment must be suitable for the work and be visually examined before every use.

Where any doubt exists that the insulation of tools and equipment might not be adequate they must not be used.

All safety equipment and tools shall be maintained and tested where required, in accordance with the manufacturer's instructions. They must not be used where the test labels are missing or the certification period has expired.

5.5.1 Training of electrical workers on testing

All workers must be competent in the safe use of their safety equipment and tools (including PPE).

All workers carrying out electrical testing must be appropriately trained and competent in test procedures and in the use of testing instruments and equipment, including—

- being able to use the device safely and in the manner for which it was intended;
- being able to determine, by visual examination and functional testing, that the device is safe for use—for example, confirming the integrity of insulated gloves prior to commencing work;
- understanding the limitations of the equipment and whether it is fit for purpose—for example, when testing to prove an alternating current circuit is de-energised, whether the device is capable of detecting the presence of capacitive charge; and
- being aware of the electrical safety implications for others when the device is being used—for example, whether the device causes the electric potential of the earthing system to rise to a hazardous level, or knowing what to do to ensure electrical safety when an inconclusive or incorrect result is obtained.

5.5.2 Personal protective equipment (PPE)

PPE for electrical work, including testing and fault-finding, must be suitable for the work, properly tested and maintained in good working order.

Training must be provided on how to select and fit the correct type of equipment, as well as training on its use and care so that it works effectively.

Depending on the type of work and the risks involved, the following PPE should be considered—

- *Face Protection*—use of a suitably arc rated full face shield might be appropriate when working where there is potential for high current and arcing.
- *Eye Protection*—metal spectacle frames should not be worn.
- *Gloves*—use gloves insulated to the highest voltage expected and thermally rated for the work being undertaken. Work gloves may be considered for de-energised electrical work.
- *Clothing*—use non-synthetic clothing of non-fusible material and flame resistant to the required thermal rating. Clothing made from conductive material or containing metal threads must not be worn.
- *Footwear*—use non-conductive footwear that complies with relevant Australian Standards.

A detailed guide to selection of personal protective equipment for work on or near low voltage electrical installations is provided in Section 9 of AS/NZS 4836:2011 'Safe working on or near low-voltage electrical installations and equipment'.

The *Occupational Safety and Health Regulations 1996* also has specific requirements for some forms of personal protective equipment.

5.6 Safety barriers

The risk assessment must determine whether a barrier is appropriate to address the relevant risks and fit for purpose.

As a control measure, suitable barriers may be designed, erected or installed to prevent inadvertent direct or indirect contact with an uninsulated energised part of the electrical installation. They can allow work to happen nearer to energised parts of an electrical installation.

Such a physical safety barrier must consist of a non-conductive material such as wood or plastic or, alternatively, correctly earthed steel and be strong enough to withstand the impact from falling objects or loose material. It must offer effective insulation and separation from adjacent energised equipment. The barrier must be of robust construction and its dimensions must be sufficient to guard the work area.

The barrier must be erected safely. This might require de-energising the electrical installation (or parts of it) while the barrier is installed.

Barriers shall be used to exclude persons generally from a work area where there is a risk from energised exposed parts. Secure housings, enclosures, doors and walls might provide appropriate safety barriers.

A barrier might be temporary or permanent and, if applicable, should clearly designate the safe work area by defining the approach path to the relevant piece of equipment/installation.

Barriers must be secured to prevent movement while the work is being performed.

5.7 Safety signs

Safety signs must be erected or installed to alert workers, warn others and direct people away from accessible dangerous work areas.

5.8 Safety observers

A competent safety observer must be present when work is carried out on an energised electrical installation unless the risk assessment has determined that there is no serious risk associated with the proposed work.

The role of the safety observer must be clearly communicated to all workers and be understood by them.

The safety observer must understand the hazards and—

- be competent to implement control measures in an emergency;
- be competent to rescue the worker who is carrying out the work if necessary, and must have been assessed in the previous 12 months as competent to rescue and resuscitate a person;
- not carry out any other work or function that compromises their role—for example, they must not be required to observe more than one task at a time;
- not be situated in the work basket of the elevating work platform from which the electrical work is being carried out;
- be able to communicate quickly and effectively with the electrical worker(s) carrying out the work. Specialist equipment might be necessary if there is a barrier to communication such as a high level of noise; and
- not have any known temporary or permanent disabilities that would adversely affect their role and performance.

5.9 Completion of work

Prior to energising the electrical installation—

- All relevant persons shall be notified that the electricity supply is about to be connected;
- A visual check shall be conducted to ensure that all tools, surplus material and wastes have been removed;
- Where applicable, circuits and equipment must be restored to normal operating condition e.g. conductor terminations might have been temporarily disconnected as part of the de-energisation procedure or protection settings modified;
- All guards and covers must be reinstated;
- All temporary electrical bonding or earthing equipment must be removed and accounted for;
- Applicable personal tags and locks shall be removed by the person who fitted them;
- Work permits must be relinquished; and
- For a high voltage installation, a suitable switching program must be carried out by an authorised switching operator.

Once the equipment is energised, functional testing may be carried out, as required, e.g. phase rotation check.

5.10 Leaving work unfinished

If work is left unfinished, the workplace must be left in a safe state including, for example, by—

- terminating or shrouding any exposed conductors;
- physically securing any exposed conductors or surrounding metal work;
- tagging, taping off the electrical equipment and the workplace area and display of warning signs;
- informing affected persons at the workplace the work is not complete and advising of potential hazards;
- ensuring that the status of switchboards and electrical equipment are clearly and correctly labelled;
- taking any other necessary precautions to ensure that electrical equipment cannot be inadvertently energised; and
- handing over adequate information to workers taking up the unfinished work to allow them to continue to work safely.

5.11 Emergency planning

Quick action after an electrical incident causing injury can save a life or significantly reduce the severity of the injury or damage to property. An emergency response plan that includes accurate location details to inform the emergency response group must also be prepared.

Any person who receives an electrical shock should seek medical attention. Even if an electrical incident does not appear to have caused injury at the time, there might be some delayed effects.

A well-prepared emergency response plan assists in managing the severity of the injury where an incident has occurred and takes into account the health and safety of those required to respond to the incident. For example, in an exposed energised high voltage situation, the electricity supply must be disconnected and the electrical equipment proved de-energised before carrying out a rescue.

Special consideration must also be given in relation to other higher-risk workplaces including working at heights (e.g. scaffolding, elevating work platforms), workplaces with hazardous atmospheres presenting a risk to health or safety from fire or explosion, and confined spaces including trenches, shafts and tunnels.

Appendix A

SAFE WORK METHOD STATEMENT

For work at: _____

Equipment involved: _____

Prepared by: _____ **on** _____/_____/20_____

Work must be carried out in accordance with this SWMS. This SWMS must be kept and be available for inspection until the electrical work to which it relates is completed. If the SWMS is revised, all versions should be kept. The SWMS must be kept for at least 2 years from the date of completion of the work.			
Person in charge of the place where the work will be carried out (Name, contact details)		**Electrical Contractor (Name, contact details)**	
Worksite manager: Contact phone no.		**Date SWMS given to EC**	
Work activity (job description)			
Person responsible for ensuring compliance with SWMS			
What measures are in place to ensure compliance with the SWMS			
Person responsible for reviewing the SWMS control measures		**Date SWMS received by reviewer**	
How will the SWMS control measures be reviewed?			
Review date		**Reviewer's signature**	

What are the tasks involved?	**What are the hazards and risks?**	**What are the control measures?**
List the work tasks in a logical order.	Identify the hazards and risks that might cause harm to workers or the public.	Describe what will be done to control the risk. What will you do to make the activity as safe as possible?

Name of worker(s) involved in the work	**EW number**	**Worker's signature(s)**
Date SWMS received by workers		

Appendix B

DECISION FLOWCHART—WORK ON OR NEAR ENERGISED ELECTRICAL INSTALLATIONS