

Electrical Safety Code of Practice 2010 Working Near Exposed Live Parts

Electrical Safety Office Queensland

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Part 1 : Introduction

1.1 Application and scope of Code

This *Electrical Safety Code of Practice 2010 – Working Near Exposed Live Parts* (the Code) replaces the *Code of Practice Working Near Exposed Live Parts 2002*.

This Code was made on 18 December 2009.

This Code commenced on 1 January 2010.

This Code expires 10 years after the above commencement date.

1.2 Legislative framework

The Queensland *Electrical Safety Act 2002* (the Act) is directed at eliminating the human cost to individuals, families and the community of death, injury and destruction that can be caused by electricity not only in workplaces, but throughout the community.

The Act sets out the obligations relating to electrical equipment that entities, employers, employees, designers, manufacturers, importers, persons in control and workers must meet in order to comply with the requirements of the law.

The fundamental principle of the legislation is to set legal requirements to ensure the electrical safety of licensed electrical workers, other workers, licensed electrical contractors, consumers and the general public.

The *Workplace Health and Safety Act 1995* (WHS Act) places obligations on certain persons to ensure workplace health and safety. Workplace health and safety is ensured when persons are free from death, injury or illness and the risk of death, injury or illness created by workplaces, relevant workplace areas, work activities or plant or substances for use at a workplace.

In terms of electrical safety, where the Act and the WHSQ Act both apply, the Act takes precedence.

The *Electrical Safety Regulation 2002* (the Regulation) prescribes, among other things, the requirements for working around exposed electrical parts.

While this Code gives practical advice on ways to manage the Act obligations, it does not provide advice about all electrical safety obligations. Four other codes of practice made under the Act are:

- *Electrical Safety Code of Practice 2010 – Electrical Work*
The *Electrical Safety Code of Practice 2010 – Electrical Work* provides practical advice and gives benchmarks for performing electrical work in ways that are electrically safe. The code provides guidance on managing electrical risk only; no guidance on other risks is provided. This code has been designed to reflect the two ways to perform electrical work: working de-energised and working live.
- *Electrical Safety Code of Practice 2010 – Electrical Equipment Rural Industry*
The *Electrical Safety Code of Practice 2010 – Electrical Equipment Rural Industry* gives practical advice on a way of discharging a rural employer or self-employed person's electrical safety obligation. Included in the code are ways to identify and manage exposure to risks of injury and property damage caused directly or indirectly by electricity.
- *Electrical Safety Code of Practice 2010 – Works*
The *Electrical Safety Code of Practice 2010 – Works* provides practical advice for an electricity entity to manage electrical safety risks associated with earthing systems, underground cable systems and supporting structures of overhead lines forming part of the works of an electricity entity.
- *Electrical Safety Code of Practice 2010 – Risk Management*
The *Electrical Safety Code of Practice 2010 – Risk Management* gives practical ways of managing electrical safety risks. The code clearly defines and explains the five step risk management process that obligation holders under the Act should perform to make sure all electrical risks are minimised.

References to legislation, Australian Standards and other documents in this Code are current at the time of printing. From time to time amendments are made to legislation. The user should therefore check to ensure applicable legislation is current at the time of reading.

1.3 What is a code of practice?

A code of practice is a document made under section 44 of the Act. It gives practical advice on ways to discharge electrical safety obligations. Included in a code are ways to identify and manage exposure to risks of injury and property damage caused, directly or indirectly, by electricity.

Under section 45 of the Act, the code of practice does not state all that a person must do, or must not do, to discharge their electrical safety obligation.

However, the person fails to discharge the electrical safety obligation if they:

- (a) contravene, or otherwise act inconsistently with, the code of practice; and
- (b) do not follow a way that is as effective as, or more effective than, the code of practice for discharging the electrical safety obligation.

1.4 What is this Code about?

This Code gives practical advice on ways to manage electrical risk when working **near** exposed live electrical parts. This Code will apply to people such as plant operators, painters, people erecting or working on scaffolds, sign makers and people working with irrigation pipes near exposed live electrical parts. The practical guidance provided in this Code may be relevant to electrical workers when they are performing electrical work near another exposed live part e.g. installing the electrics on a billboard next to electric lines.

This Code does not apply to electrical workers working **on** exposed live electrical parts e.g. an electrician performing faultfinding work on a live switchboard.

A separate code has been developed to provide practical advice to electrical workers performing electrical work.

Appendix A contains the meaning of terms used in this Code.

1.5 What is ‘working near exposed live parts’?

For **high voltage**, there is a risk of electrical arcing even if a person does not actually come into contact with an exposed live part. Consequently, the regulation sets exclusion zones. For high voltage situations, a person is working near exposed live parts when that person is likely, either directly or through any conducting medium, to enter the exclusion zone.

Information on exclusion zones can be found in Part 3 of this Code.

For **low voltage**, a person is working near exposed live parts; when that person is likely, either directly or through any conducting medium, to enter the exclusion zone or to contact the exposed live part.

A part is:

- **exposed** where it is bare or not effectively insulated or guarded by a fixed barrier or an earthed metal shield; and
- **live** until it is isolated and proven to be de-energised and not likely to become re-energised; if the part is a high-voltage conductor, it is considered live until it is earthed.

An electrical part means an exposed part or an overhead insulated electric line.

For a complete list of definitions and meaning of terms used in this Code, please see Appendix A.

Appendix C contains case studies of work near exposed live parts.

1.6 Obligations under the *Electrical Safety Act 2002*

Division 2 of the Act imposes obligations on persons who may affect the electrical safety of others by their acts or omissions.

For example, an employer has an obligation to ensure his or her business or undertaking is conducted in an electrically safe way. This includes identifying electrical risks, assessing the risk of injury or property damage that may be attributed to risks, and taking necessary actions to minimise risk exposure.

The full list of obligation holders is contained in part 2 of the Act.

1.7 How can I meet my obligations?

Under sections 41 to 45 of the Act, there are three methods outlined to assist you in meeting your electrical safety obligations: through regulations, ministerial notices, or codes of practice.

Where applicable, you must comply in the following manner to meet your obligations:

- If a regulation is identified as prescribing a way of discharging your electrical safety obligation, you will fail to meet your obligation if you contravene the regulation.
- If a ministerial notice prescribes a way of meeting an electrical safety obligation in relation to an electrical risk, you will fail to meet that obligation if you contravene the ministerial notice.
- If a code of practice states a way of meeting your electrical safety obligation, you will fail to meet that obligation if you:
 - contravene the Code or act in a way inconsistent with the Code; and
 - do not follow a way that is equally effective to, or more effective than, the Code for discharging your electrical safety obligation.

If this Code is inconsistent with the Regulation, then the Regulation prevails to the extent of the inconsistency.

If the Code and the Regulation are inconsistent with a ministerial notice, the ministerial notice prevails to the extent of the inconsistency.

Refer to Part 2 of this Code on risk management for meeting general obligations.

1.8 Defences for failing to meet your electrical safety obligation

Under sections 46 and 47 of the Act, if charged with a breach of obligation, you can provide a valid defence by establishing that the offence was due to causes beyond your control. In this instance, you cannot claim as a defence those sections of the Criminal Code relating to an accidental act or omission, or a mistaken belief.

Where there was no regulation, ministerial notice or code of practice that told you how to meet your electrical safety obligation under the circumstances, you can seek to establish that you chose an appropriate way, took reasonable precautions and exercised proper diligence to discharge the safety obligation.

1.9 Penalty for failure to meet your electrical safety obligation

Under section 27 of the Act, a person on whom an electrical safety obligation is imposed must discharge the obligation.

Maximum penalty:

- if the breach causes multiple deaths: 2000 penalty units or three years imprisonment;
- if the breach causes death or grievous bodily harm: 1000 penalty units or two years imprisonment;
- if the breach causes bodily harm: 750 penalty units or one year's imprisonment; or
- otherwise: 500 penalty units or six months imprisonment.

This Code should be read in conjunction with the Act, the Regulation, and other relevant codes of practice. Hard copies of these documents are available from the Queensland Government Bookshop by phoning (07) 3883 8700 or 1800 801 123 (outside Brisbane), or by visiting www.bookshop.qld.gov.au.

Further information on electrical safety is available from the Department of Justice and Attorney-General website at www.electricalsafety.qld.gov.au or by phoning the Infoline on 1300 650 662.

Part 2 : Risk Management

'Risk management' is defined by the Australian / New Zealand Standard *AS/NZS ISO 31000:2009 Risk Management* as 'the coordinating of activities to direct and control an organisation with regard to risk'.

The term 'hazard' is often used as an identifier of potential sources of risk. However in the practical application of risk management principles, it is the risk itself that must be addressed. The *AS/NZS ISO 31000:2009 Risk Management Standard* (the Standard) refers to the identification of risk, while the term hazard is used in Workplace Health and Safety and Electrical Safety legislation in the same context. Similarly, 'risk control' is referred to in the Standard as 'risk treatment'. These distinctions are definitional only and the terms 'risk' and 'treatment' are used in this code for the purposes of clarity and consistency with the Standard.

The risk management process required by the WHS Act is systematically divided into five steps:

1. identify hazards (risks under the Standard), based on experience, recorded data and other information;
2. assess risks that may result because of the hazards (risks) by making an evaluation of the level of risks to the health and safety of workers, based on the consequences and likelihood of harm;
3. decide on control measures (risk treatment measures under the Standard) from the hierarchy of control (risk treatment hierarchy) i.e. eliminate, substitute, isolate or engineer out the risks, or reduce them through administrative measures or personal protective equipment to prevent or minimise the level of the risks. This should be achieved by selecting the highest order control (treatment) method possible and then proceeding down the list in order;
4. implement the selected control (treatment) measure(s) in the workplace; and
5. monitor and review the effectiveness of the control (treatment) measures to ensure that they are working correctly to control the risks and that no other risks have been introduced.

NOTE: Compliance with the risk management process does not excuse a person from ensuring workplace health and safety or from complying with an obligation under the Act.

Effective risk management involves identifying all of the risks in the workplace, and then carrying out a risk assessment for each, to assess its severity, before deciding its priority for treatment. When carrying out a risk assessment, determine the risks that have the greatest potential to cause harm and a greater likelihood of occurring. These risks are controlled (treated) first, followed by the less serious risks.

Attention should be given to risks that may be easy to fix but may have low risk priority scores (e.g. power leads across the floor). These risks should be fixed promptly. Particular attention should be given to risks that may have very low likelihood of causing harm but may result in major consequences.

The Act requires that electrical work and associated equipment be electrically safe (sections 29 to 40); that is, free from electrical risk. Electrical risk can be managed through the risk management process as described below. Specific applications of the risk management process are covered in relevant following parts.

In many circumstances, the risks associated with undertaking electrical work near exposed live parts can be equivalent to those associated with live electrical work. Evaluation of the risks and development of risk treatment measures as described in Part 5 of the *Electrical Safety Code of Practice 2010 - Risk Management* will provide assistance in developing safe work practices.

2.1 Risk

Risk is the likelihood and consequence of injury or harm occurring.

For example, if the risk is electricity, there the likelihood that a worker might be electrocuted because of the exposure to electrical live parts.

The degree of risk will depend on the amount of exposure to the risk. With regard to electricity, this would relate to aspects of the electricity i.e. voltage, frequency of exposure, and degree of risk treatment measures in place.

2.2 The risk management process

Effective risk management involves identifying all of the risks in the workplace, carrying out a risk assessment for each risk, to assess the severity of the risk, then deciding on and implementing risk treatment measures.

When carrying out a risk assessment, determine the risks that have the greatest potential to cause harm and a greater likelihood of occurring. These risks are treated first, followed by the less serious risks.

As set down in the *Electrical Safety Code of Practice 2010 - Risk Management*, there are five basic steps in the risk management process:

Step 1: Identify all risks by:

- observing, inspecting, investigating, communicating and consulting; and
- making a record of the risks identified.

Step 2: Assess the risks by:

- assessing and prioritising the risks;
- dealing with the highest priority risks first; and
- dealing with less risks or least significant risks last.

Step 3: Decide on measures to treat the risks by:

- eliminating the risk; or
- if elimination of the risk is not possible, select these treatment measures in the following order of preference:
 - substitution e.g. using machines with better guarding;
 - isolation (not administrative) e.g. remove or separate people from the risk;
 - minimisation by engineering e.g. modify a machine so it can be used by remote control;
 - application of administrative measures e.g. using signs, training or policies to treat risk; and
 - use of personal protective equipment (PPE), equipment or clothing designed to protect the worker.

Step 4: Implement appropriate treatment measures that will:

- adequately treat the risks;
- not create other risks; and
- allow workers to do their work without undue discomfort or distress.

Step 5: Monitor the treatment measures and review the process:

A: Monitor

- Have the treatment measures been implemented as intended?
- Are the treatment measures adequate?
- Did the implementation of treatment measures create other risks?

B: Review

- Has anything changed over time since the risk process was implemented?
- Is the treatment of risks still adequate?
- Was the risk management process conducted effectively?

For further information on risk management and guidelines on how to complete a risk assessment, please refer to the *Electrical Safety Code of Practice 2009 - Risk Management*.

The five step risk management process is illustrated in Figure 1.

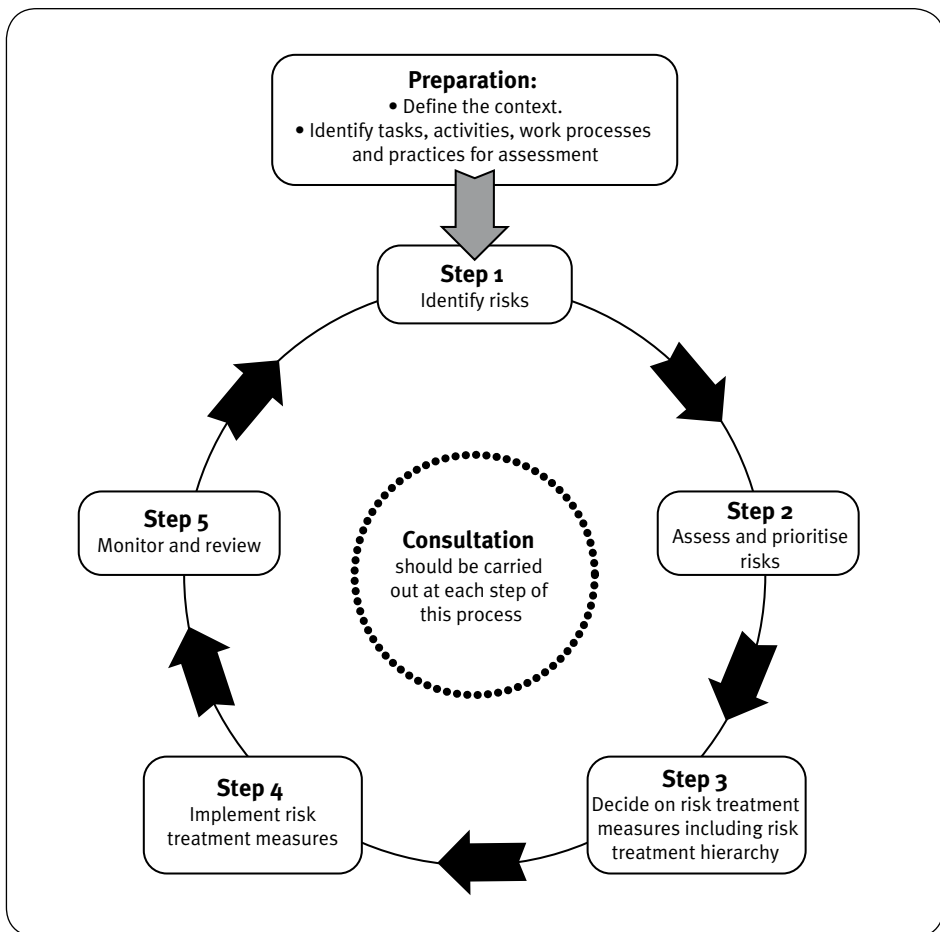


Figure 1: The five step risk management process

2.3 Instruction, training and supervision

Under the *Workplace Health and Safety Act 1995*, sections 28 and 29, a person who conducts a business or undertaking must provide instruction, training and supervision to persons to whom they owe an obligation. Section 30 of the *Electrical Safety Act 2002* sets down the obligation of an employer or self-employed person to ensure their business or undertaking is conducted in a way that is electrically safe. Providing training to workers helps to ensure that employers meet this obligation.

Workers who are likely to be exposed to electrical risks, and anyone supervising these workers, should be trained and provided with information and instruction.

Training should be appropriate to the type of work to be performed. In some cases, formal training may be required whereas in others, on-the-job training may be more appropriate. The special needs of workers should be taken into account in deciding on the structure, content and delivery of training. This assessment should include consideration of literacy levels, work experience and the specific skills required for a job.

Adequate and appropriate training is a way of managing the risks associated with electrical risks. This can be done by:

- determining who needs to be trained;
- determining what training is required;
- determining how training will be delivered;
- ensuring that the training is provided;
- evaluating the training; and
- keeping training records.

The amount of training will be determined by:

- the nature of the workplace risks;
- the degree of risk associated with these risks;
- the complexity of work, such as operating procedures and equipment;
- other risk treatment measures being implemented; and
- the qualifications and experience of the worker.

2.3.1 Types of training

There are different types of electrical safety training with different purposes, including:

- Induction training: for workers when commencing employment or when new to the job. This training is general and may involve a workplace tour and information about conditions of employment, administration, organisational structure, emergency procedures and workplace amenities.
- Supervisor and management training: provided to help ensure the supervision and management of electrical safety issues are appropriately carried out in the workplace.
- Specific job training or familiarisation training: providing information about the electrical and other risks associated with the job.
- Specific electrical risk training: providing information about the risks associated with working near exposed live parts.
- Ongoing training or refresher training: provided periodically to ensure that work continues to be performed safely.
- Emergency procedures training: provided to ensure workers know what to do in the event of an emergency, including identifying persons with specific emergency roles and responsibilities.
- First aid training: provided to ensure appropriate procedures are followed for administering first aid.
- Job specific training required under a Regulation e.g. safety observer.

Part 3 : Exclusion Zones

3.1 What is an exclusion zone?

An exclusion zone is a safety envelope around an electrical part. No part of a worker operating plant or vehicle may cross into the exclusion zone while the electrical part is live.

Exclusion zones keep people, operating plant and vehicles away from live electrical parts, such as overhead power lines. Keep yourself and anything associated with your activity out of the zone.

3.2 When do exclusion zones apply?

Exclusion zones apply whenever you need to carry out some work, or operate plant or a vehicle, around a live electrical part and you cannot eliminate the risk.

Ways of removing the risk include having the electricity turned off and tested, or having the lines shifted.

The number one safety rule is to have the power turned off and tested and, if the electrical part is high voltage, have it earthed.

If you cannot eliminate the risk, the exclusion zones apply. The Regulation says you must follow this system for the safety of yourself and others.

3.3 A simple guide to exclusion zones

An exclusion zone extends in all directions, not just sideways, it is all around the electrical part. A person must not enter an exclusion zone.

To work near an electrical part, you should have the power turned off, which rules out the need for an exclusion zone altogether and is the best option.

If you cannot have the electricity turned off, the power line remains live and dangerous. An exclusion zone applies. Keep yourself and everything you do out of the zone.

The area of an exclusion zone may vary, but it will always exist. Before you start to work or operate near a live electrical part, you need to confirm the correct exclusion zone.

The exclusion zone is based on the overall situation and what you can do to reduce the electrical risk. You must gather the necessary facts and then use the information to look up the correct exclusion zone on the tables in this guide. For details of exclusion zone distances, see Appendix B of the code and also schedule 2 of the Regulation.

You should consider:

- What is the voltage of the power line?
- Is it insulated or bare?

If you don't know these facts, you should ask the electricity distribution entity or the property owner.

You should also consider:

- Who or what will work near the power line? Will it be:
 - an untrained or an authorised person?
 - an operating plant?
 - a vehicle?

If you have an authorised or instructed person involved, you can work to a smaller exclusion zone. That is because electrical training or experience helps manage the risk.

On site, the authorised person could be the plant operator, supervisor, electrician or worker.

Equipped with the right electrical training or experience, the authorised person works to a different exclusion zone or supervises instructed people, or both.

All of these factors govern the size of your exclusion zone and could allow you to work safely to a smaller exclusion zone.

Please refer to Appendix C for case studies of exclusion zones.

Part 4 : Operating cranes and plant near overhead electric lines

Contact with overhead powerlines can pose a risk of electrocution when operating a crane or other plant. It can be extremely difficult for crane or plant operators to see powerlines and to judge distances from them.

4.1 Scope

This part is for untrained persons operating plant that may come into contact with or come within an exclusion zone, for example:

- cranes;
- concrete placing booms;
- elevating work platforms (EWP); and
- earthmoving equipment.

Electric lines covered by this part include:

- overhead electric distribution lines on poles: high or low voltage;
- overhead electric transmission lines on towers;
- dedicated overhead electric lines used by public transport authorities e.g. tramways and railways; and
- privately owned overhead electric lines.

Please refer to Appendix C for case studies about operating cranes and other plant near overhead electric lines.

4.2 Risk management process for a crane or other operating plant working near overhead electric lines.

This part should be read in conjunction with Part 2 of this Code.

4.2.1 Risk identification

Before setting up a crane or other operating plant such as an EWP in the vicinity of overhead electric lines, the employer or self employed person should conduct an inspection to identify potential risks. Consultation regarding the work and the related risks should occur between the employer or self-employed person and the crane or operating plant operator. Electric lines should always be treated as live.

There are two options for working near overhead powerlines:

- have the powerlines de-energised; or
- stay outside the exclusion zones.

Note: If powerlines are to be de-energised, arrangements should be made with the electricity entity, or person in control of the line, as early as possible when planning work. The de-energising process can take some time and, depending on the circumstances, may delay work. Where powerlines have been de-energised, confirmation should be sought from the person in control of the power line.

4.2.2 Risk assessment

If a risk involving overhead electric lines has been identified, the employer or self-employed person should conduct a written risk assessment to determine the risk of encroaching on the exclusion zone. A copy of this assessment should be kept for future reference. In assessing the risk the employer or self-employed person should consider:

- Identifying the minimum clearance distance from the closest part of the crane or other operating plant to the power line.
- In the case of a crane, the nature of the load to be moved e.g. dimensions and whether the load is conductive. When in contact with high voltage, material that would normally be non-conductive may become conductive. All materials should be assumed to be conductive unless a competent person can confirm otherwise.
- Whether the load is being carried above the electric lines and may accidentally fall onto the live lines e.g. moving a swimming pool from the street over live electric lines into the yard of a home.
- Unexpected movement of the terrain, ground or surface upon which the crane or plant is located, possibly resulting in a corresponding surge or sudden movement towards live electric lines.
- Prevailing or unexpected wind strength and direction and weather conditions.
- The possibility of sway and sag of the overhead powerlines (sway of overhead powerlines is usually caused by wind, while sag may vary as temperatures vary).
- In the case of a crane, the size and shape of the load, particularly the surface area facing the wind.
- Functional behaviour of the crane, load or plant that could result in

inadvertent contact with electric lines.

- Possibility of crane or plant becoming live through voltage induced by adjacent electric lines, especially high voltage lines.
- How the load being carried by a crane is secured and whether any part of the load may inadvertently move during the operation and encroach on the exclusion zone.

The outcome is a priority list of treatment measures based on risk levels.

4.2.3 Deciding on treatment measures

This step involves deciding on treatment measures to eliminate the risk entirely or minimise the risk of injury or property damage. This Code provides some treatment measures. The employer or self employed person should adopt the measures detailed in this Code or adopt another method that is equal to or better in managing the risk.

The preferred risk treatment hierarchy is:

A. Eliminate the risk

This could involve de-energising the lines, rerouting the electric lines away from the crane or other operating plant or replacing existing overhead lines with underground lines. Arrangements for de-energising and re-routing lines should be made with the electricity entity, or person in control of the line, as early as possible when planning work. The de-energising process can take some time and, depending on the circumstances, may delay work. Where powerlines have been de-energised, confirmation should be sought from the person in control of the power line.

See part 4, division 3, of the Regulation with regard to consultation with persons in control of electrical lines.

B. If elimination of the risk is not possible, select these treatment measures in the following order:

(i) Substitute with a less risky process or equipment

This could mean finding another way of performing the task or tasks. For example the use of an effectively tested insulated elevating work platform bucket could prevent electric shocks from the exposed live part to ground via the operating plant. Please note that, in spite of the insulated bucket, the worker could still receive an electric shock by touching a current source with one hand and an earth point with the other hand. An insulated bucket, while preventing some electric shocks does not eliminate the risk entirely.

(ii) Isolate the risk

This could involve installing or erecting a physical barrier to prevent any part of the machine or the load being moved from encroaching on the exclusion zone. A physical barrier should consist of a non-conductive material such as wood or plastic or alternatively correctly earthed metal and be strong enough to withstand any impact from falling objects, loose materials or contact by the crane or other operating plant. Before any barriers are erected, a risk assessment must be carried out by an appropriately qualified person to ensure the appropriate design and correct materials are used. The barrier must be erected safely. This may entail isolating the electricity supply while the barrier is installed.

(iii) Re-design equipment or work process

This could involve using limiting devices to prevent the jib from entering the exclusion zone or warning the operator before the jib enters the exclusion zone. If a limiting device is used, the interlocking or warning system should be designed to 'fail safe' or should at least meet category four (4) reliability in accordance with *AS4024.1 Safeguarding of Machinery* or a SIL of three (3) under *AS61508 Functional safety of electrical / electronic / programmable electronic safety-related systems*. Where the limiting device prevents movement, sudden stopping or the momentum of the load should be catered for.

(iv) Introduce administrative risk treatment measures

This risk treatment method could include measures such as using a safety observer when the crane or other operating plant is operating in the safety observer zone. See Part 4.3 of this Code for special precautions for working in the safety observer zone or authorisation zone. It is also possible to install proximity sensors and alarms to warn the crane or operating plant operator of imminent risk of entering the exclusion zone or contacting the line. A physical administrative treatment measure could be to use visible markers, such as 'tiger tails' installed on electric lines and stay wires to make them easier to see and locate. Tiger tails do not insulate wires.

(v) Use appropriate personal protective equipment (PPE)

This risk treatment method could include the use of effectively maintained insulating gloves by anyone who may come into contact with any conducting part of the crane, plant or load being moved.

In deciding which treatment measure to adopt, the employer or self-employed person should start at the top of the risk treatment hierarchy i.e. (i) eliminate the risk and work through to (v) use appropriate PPE.

4.2.4 Implement risk treatment measures

In implementing risk treatment measures, it may be necessary to take special precautions particularly when it is not possible or practical to totally prevent exposure to the risk. Examples of such precautions are detailed in Part 4.2.3.

4.2.5 Monitor and review

In monitoring and reviewing the effectiveness of risk treatment measures, it may be necessary to modify the measures or the way they were implemented.

4.3 Working in the safety observer zone and authorisation zone

4.3.1 What is the safety observer zone?

A crane or plant is considered to be in the safety observer zone when, by the position the crane or plant is located, it is possible that any of the following could enter the exclusion zone of live electric lines during operation:

- any part of the crane or operating plant;
- any person on or working on an EWP;
- any hand tools or other equipment held by anyone involved with the operation; and
- the load being moved.

The safety observer zone concept is designed:

- to encourage operating plant operators to locate their equipment away from the possibility of encroaching into the exclusion zone; and
- when that is not possible, adopt other suitable precautions to prevent encroachment.

A crane or operating plant is not operating in a safety observer zone when:

- high voltage electric lines have been de-energised and earthed;
- limiting devices have been installed to warn the operator or prevent any part of the crane, plant or load being moved from entering the exclusion zone; or
- any part of the crane, plant or load being moved is prevented from entering the exclusion zone by physical barriers.

The safety observer zone for electric lines on poles and on towers is illustrated in Figure 2. Please note that, while this figure illustrates a crane operating, the example applies to all operating plant.

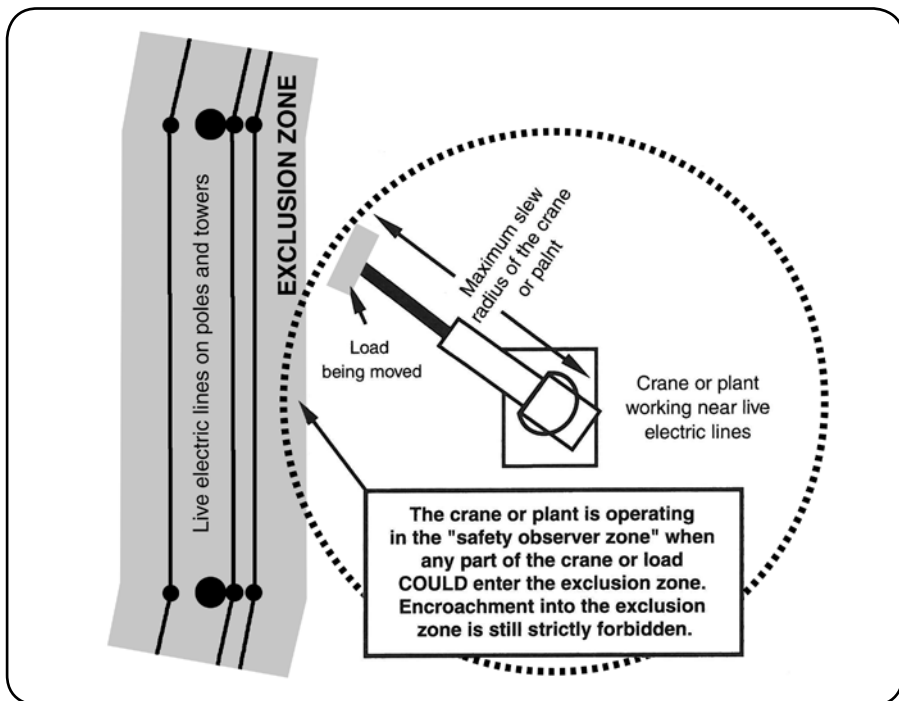


Figure 2: Safety observer zone for overhead electric lines on poles and towers

4.3.2 Special provisions for working in the safety observer zone

Safety observer for the safety observer zone

A safety observer should be employed when a crane or operating plant is operating within the safety observer zone as defined in Part 4.3.1 above.

The following special provisions apply:

- (i) The operator's employer or a self-employed operator is responsible for appointing a safety observer. If any part of the crane or plant or load is about to enter the exclusion zone, the safety observer should warn the operator. Encroachment into the exclusion zone is strictly forbidden.

- (ii) The operator should not operate a crane or plant without a safety observer in situations where an observer is required under sections 61(5) and 62 of the Regulation.
- (iii) The safety observer should not carry out any other work or function that compromises their role as a safety observer.
- (iv) The safety observer should not be required to observe more than one crane or operating plant at a time.
- (v) The safety observer should be able to communicate effectively with the operator of the crane or operating plant at all times and should warn the operator about the approach to the exclusion zone. Specialist communication equipment may be necessary where there is a barrier to communication.
- (vi) Except where rail mounted elevating work platforms are being used for working on rail traction electrical apparatus, the safety observer should not be located on the work basket of an elevating work platform.
- (vii) The safety observer should be trained to perform the role.
- (viii) The safety observer should have the authority to stop the operation of the crane or operating plant.
- (ix) The safety observer should mark the border of the exclusion zone with suitable markers e.g. red warning tapes, which can be easily viewed by the crane or plant operator.

4.3.3 What is the authorisation zone?

A crane or other operating plant is in the authorisation zone when it is operated by an authorised or instructed person. Under section 59 of the Regulation, an authorised person is one who has enough technical knowledge and experience to do work that involves contact with, or being near to, the electrical part and who has been approved by the person in control of the electrical part to do work that involves contact with, or being near to, the electrical part, or is authorised to act for the person in control of the electrical part.

An instructed person is one who is acting under the supervision of an authorised person for the electrical part.

When a crane or other operating plant is in the authorisation zone, or when it is

intended to operate in the authorisation zone, a safety observer or another safe system of work must be used which will prevent contact with the low voltage line, or where contact is allowed, prevent damage to the line.

Another safe system of work may include one or more of the following precautions:

- Use of an exclusion zone between low voltage electric power lines and a crane or other operating plant. A one metre distance or, where circumstances demand, a greater distance, may be necessary to ensure that contact and possible damage to the line does not occur. The distance would need to allow for such risks as inadvertent movement of operating plant due to unstable foundation. A one metre exclusion zone may not be necessary in respect of low voltage communication lines.
- Use of limit switches to prevent the crane or operating plant from contacting the line.
- Positioning and design of the crane or operating plant which will prevent the plant from contacting the line.

Under section 62(3) of the Regulation, where work with a crane or operating plant operated by an authorised person involves contact with an energised insulated low voltage line, a safety observer must be used.

How do I become an authorised person?

In order to authorise a worker, the employer or self employed person must first gain approval from the person in control of the electrical part to do the work that involves being near to the electrical part. The employer or self-employed person would need to ensure that the worker has enough technical skill and knowledge to perform the work.

In many instances, approval would need to be sought from an electricity entity. However, if it is a private electric line, the owner would need to approve the person to work near the line. For example, if the private electrical line is on a farm, the employer or self-employed person would need to seek approval from the farm owner before the worker can be authorised. Once the approval is gained from the person in control, the employer or self employed person would need to authorise the worker to do the work.

4.3.4 Special provisions for working in the authorisation zone

Safety observer for the authorisation zone

A safety observer should be used when a crane or other operating plant is operating within the authorisation zone as defined in Part 4.3.3 above.

The following special provisions apply:

- (i) The operator's employer or self-employed operator is responsible for appointing a safety observer. If any part of the crane or operating plant or load is about to contact the low voltage line, the observer should warn the operator.
- (ii) Where contact is not permissible under the Regulation, a crane or operating plant must not be operated in the authorisation zone without a safety observer or another safe system of work that prevents contact with the line.
- (iii) The safety observer should not carry out any other work or function that compromises their role as a safety observer.
- (iv) A safety observer must be used where an authorised or instructed person is allowed to contact the line under the Regulation.
- (v) The safety observer should not be required to observe more than one crane or operating plant at a time.
- (vi) The safety observer should be able to communicate effectively with the operator of the crane or operating plant at all times. Specialist equipment may be necessary where there is a barrier to communication.
- (vii) The safety observer should have the authority to stop the operation of the crane or operating plant.
- (viii) Except where rail mounted elevating work platforms are being used for working on rail traction electrical apparatus, the safety observer should not be located on the work basket of an elevating work platform.
- (ix) The safety observer should be trained to perform the role.
- (x) The safety observer should mark the border of the exclusion zone with suitable markers e.g. red warning tapes, which can be easily viewed by the crane or plant operator.

4.3.5 Personnel in contact with the crane, load or operating plant

When the crane or operating plant is operating in the safety observer zone or authorisation zone, only the following persons should be allowed to touch any part of the crane, plant or load being moved:

- (a) The operator, while not in contact with an electrical earth e.g. operator remaining in the cabin instead of standing on the ground beside the crane or plant.
- (b) The operator, while standing on the ground or while in contact with an earthed situation, may operate the crane or operating plant under any of the following conditions, when used appropriately:
 - (i) the controls are effectively insulated¹;
 - (ii) the operator wears insulating gloves¹ where the voltage of any of the overhead electric lines does not exceed 1000 volts; and
 - (iii) the operator stands on an equipotential metallic mat, which is electrically connected to all metalwork associated with the controls.

Other personnel who are essential to the particular operation of the crane or operating plant e.g. dogger, crane chaser or other worker helping to set up the crane or operating plant, are permitted to work within the safety observer zone, provided these persons are not required to have direct contact with any part of the crane, operating plant or load. However, where direct contact is necessary:

- (i) effectively maintained insulating gloves¹ should be worn; or
- (ii) such contact should be via a non-conductive object e.g. pole or tail rope used to control load movement.

For further information on the safe operation of tower and mobile cranes, please refer to the *Workplace Health and Safety Tower and Mobile Crane Codes of Practice*.

¹ Insulation must at least be effective against the maximum voltage of the particular overhead electric line. The employer or self-employed person operating the crane is responsible for ensuring the effectiveness of the insulation in accordance with the relevant Australian Standard.

Part 5 : Work near low voltage overhead electric lines near buildings and structures

5.1 Scope

This part applies to:

- painting or maintenance work near low voltage overhead lines;
- erection of scaffolding near a low voltage overhead line;
- building work near low voltage overhead lines; or
- any other non-electrical work where there is a risk of contact with a low voltage overhead lines.

Electric lines covered by this part are:

- electricity distributors' low voltage overhead lines including service lines;
- low voltage overhead lines forming part of consumers' installations; and
- any low voltage overhead line within the jurisdiction of the Regulation.

Please refer to Appendix C for examples/case studies of work near overhead electric lines near buildings and structures.

5.2 The no-touch and exclusion zones for low voltage lines near buildings and structures

Guidance in this part, taken from Appendix B, is based on no-touch and exclusion zone concepts, defined as follows.

For an authorised person, a no-touch zone applies to an insulated low voltage overhead line that has been examined for visible defects (see Part 6 of this Code for requirements of the assessment). You may go as close to the line as you need to but do not touch the line.

5.2.1 Exclusion zones for low voltage overhead lines near buildings and structures

For an untrained person, the exclusion zone for low voltage overhead lines near buildings and structures is as follows:

- Without consultation, the exclusion zone is three metres from the lines.
- With consultation, the exclusion zone is specified in Appendix B. The purpose of the consultation is to determine the voltage of the line and inform the owner of the line that you are carrying out work near the line.
- The exclusion zone applies to bare or covered low voltage and insulated lines not examined for visual defects.

The following table clearly illustrates exclusion and no touch zones for low voltage lines near buildings and structures.

Table 1: Exclusion zones and no-touch guidance for low voltage lines near buildings and structures

Types of electrical service lines near buildings and structures	Insulated Low voltage (examined for visual defect – see Part 6)	Covered low voltage	Insulated low voltage lines – NO visual examination conducted	Bare low voltage
Designated zones	No-touch zone. Go as close as you need to but do not touch.	Without consultation* with electricity entity, exclusion zone is 3000mm from the live electrical line. With consultation*, refer to Appendix B for allowable safe approach distances.		

* Note: The purpose of the consultation is to determine the voltage of the line and inform the owner of the line that you are carrying out work near the line.

5.3 Risk management process for work near low voltage overhead electric lines near buildings and structures

This part should be read in conjunction with Part 2 of this Code.

5.3.1 Risk identification

Before carrying out work where a person might unintentionally encroach into the exclusion zone, the employer, self-employed person or supervisor of the operation should make an inspection to identify any potential risks. This step will help to determine the level of risk and establish a priority list based on that risk. A copy of the assessment should be kept for future reference.

Risks may include:

- bare exposed live lines;
- broken down insulation;
- deterioration of earthing of exposed conductive parts that are required to be earthed;
- voltage of the line is higher than the expected low voltage; and
- possibility of equipment, such as a portable powered saw, coming into contact with exposed live parts.

Note:

- (i) If the overhead line is found to be a high voltage line, this part of the Code does not apply.
- (ii) If the voltage of the line cannot be determined, the line should be deemed as a high voltage line and note (i) will apply.
- (iii) If you cannot determine whether the line is effectively insulated, the line should be treated as being bare.

5.3.2 Risk assessment

If a risk involving electric lines has been identified, a written assessment should then be conducted to determine the risk to a person (or something he or she is carrying, or something attached to that person) encroaching into the exclusion zone. This step will help to determine the level of associated risk and establish a priority list based on that risk level. A copy of the assessment should be kept for future reference.

The following factors may be included in a risk assessment:

- Type of work being carried out, tools or equipment being used, and the risk of mechanical damage to the line if contact were made. Examples may include:
 - Handling a sheet of roofing material where loss of control could occur and the material could come within the exclusion zones.
 - Using a cutting or grinding tool where loss of control of the tool is a risk and where the tool could come within exclusion zones through loss of control or from inadvertent movement.
 - Using a heavy electric disc sander to sand timber near the point of attachment of a service line may impose a high risk of encroaching the no-touch zone if control were lost. The risk of damage to and contact with the line and consequent electric shock is high if the sander touched the line. Manual sanding should be considered.

- Proximity of the work to the overhead line.
- Environmental conditions, such as rain, wind or uneven terrain, which may bring a risk of unexpected movement of tools or equipment held by workers.

Visual Examination of low voltage overhead line

An insulated low voltage overhead electric line should be examined for visible defects. The line is generally divided into two portions:

- a) The overhead, aerial line portion of the overhead line up to, but not including, the point of connection to the fixed wiring of the structure to which the overhead line connects.
- b) The means of connection e.g. mains connection box or line clamps insulated with tape or heat-shrink or other means, and where applicable, the fixed wiring tails of the circuit to which the line is connected.

The following assessment procedure should be adopted to ensure that an overhead line has no defects as assessed visually. If the line is part of a customer's installation, a licensed electrical worker should assess the line. If the line is the property of an electricity entity, either an electrical worker with relevant experience or the entity should be engaged to have the line assessed.

The line is visually checked to ensure that:

- the insulation is intact, with no tears, cracks or other physical defects and there are no exposed live parts along the line; and
- there are no exposed live parts anywhere on the line.

5.3.3 Deciding on risk treatment measures

This step involves deciding on risk treatment measures to eliminate the risk entirely or minimise the risk of injury or property damage that may result. The preferred risk treatment hierarchy is:

A. Eliminate the risk.

This could involve de-energising the line during the work or re-routing the service line away from the work area. Electricity entities could be contacted to de-energise the line. Arrangements for de-energising and re-routing lines should be made with the electricity entity as early as possible when planning work. The de-energising process can take some time and depending on the circumstances, may delay work. Where powerlines have been de-energised, confirmation should be sought from the person in control of the power line.

B. If elimination of the risk is not possible, select these risk treatment measures in the following order:

- (i) **Substitute with a less risky material, process or equipment.** This could mean, for example, using non-conductive scaffolding instead of metal scaffolding.
- (ii) **Isolate the risk.** This could mean erecting a physical barrier to prevent a person or anything held by a person, or attached to the person, encroaching into the exclusion zones. A physical barrier should consist of a non-conductive material such as wood or plastic or, alternatively, correctly earthed metal, and be strong enough to withstand any impact from falling objects or loose materials. Before any barriers are erected, a risk assessment must be carried out by an appropriately qualified person to ensure the appropriate design and correct materials are used. The barrier must be erected safely. This may entail isolating the electricity supply while the barrier is installed.
- (iii) **Redesign equipment or work process.** For instance, this may involve someone sanding by hand near the point where an overhead line meets a building, rather than using an electric disc sander. It could also involve using an insulated fibreglass extension handle on a paint roller, instead of a conductive aluminium extension handle.
- (iv) **Introduce administrative risk treatment measures.** This includes planning and documenting the work procedure before starting work or using a safety observer to warn people before they encroach into the exclusion zones. A physical administrative treatment could be to use visible markers, such as 'tiger tails' installed on electric lines and stay wires to make them easier to see and locate.
- (v) **Use appropriate personal protective equipment.** This includes the use of effectively electrically tested insulating gloves by anyone who may be at risk of encroaching into the exclusion zones.

In deciding which risk treatment measure to adopt, you should start at the top of the risk treatment hierarchy and work your way down.

5.3.4 Implement risk treatment measures

In implementing risk treatment measures, you should develop an implementation plan that:

- specifies the preferred treatment options;
- sets out the steps that need to be taken to implement the treatment measures;
- identifies and allocates the resources necessary to implement the treatment measures (i.e. time and expenses);
- allocates responsibilities and accountabilities (i.e. who does what and when);
- sets the timeframe for implementation (i.e. when it is to be completed by); and
- sets a date for reviewing the treatment measures.

5.3.5 Monitor and review

In monitoring and reviewing the effectiveness of treatment measures, it may be necessary to modify the measures or the way they were implemented.

Part 6 : Clearing vegetation near overhead electric lines

6.1 Scope

This part of the Code applies to untrained persons who cut and trim or treat with chemicals or other processes, trees and other foliage near overhead electric lines where:

- the person or something the person is holding or is in contact with, could come within the exclusion zones of exposed live parts; or
- the work creates risk of damage to electric lines or apparatus.

Untrained person, means a person who is not an authorised person or an instructed person for the electrical part.

Examples of untrained persons performing vegetation management near electric lines include:

- a householder trimming a tree on his or her property;
- a local government work crew (other than those who are authorised persons for clearing of vegetation around electric lines) performing vegetation clearing or planting or vegetation treatment;
- a building or road construction contractor performing vegetation clearing or trimming work; and
- a person picking fruit from trees.

Please refer to Appendix C for examples/case studies of work near overhead electric lines.

6.2 Exclusion zones

Exclusion zones and regulatory requirements for all live electric lines are described in Part 3 of this Code.

Exclusion zones vary according to the voltage, the type of overhead powerlines and the qualifications/experience of the person performing the work.

The actual distances are set out in schedule 2 of the Regulation and in Appendix B of this Code. A person must not work in situations where:

- any part of a crane or operating plant being operated; or
- any hand tools or other equipment or load held by any person involved with the operation is likely to encroach into the exclusion zones for the electric line.

See Appendix A for the meaning of terms used in this Code.

6.3 Requirements for untrained persons

Under section 60(1) of the Regulation, an untrained person must not allow any part of their body or anything they are handling or wearing to go into the relevant exclusion zones. The only exception (section 61(4A)) is if the person is handling an insulated device which has been tested and found to be safe for use on and near the electrical part.

A person should not undertake tree trimming or vegetation management where any part of the tree or vegetation to be treated or cut or otherwise worked on is within the exclusion zones.

A person should not undertake tree trimming or vegetation management where any part of the tree or vegetation could fall or otherwise be carried within the exclusion zones.

Under section 62(2) and (3) of the Regulation, the requirements regarding a person or operating plant coming into direct contact with an electrical part or coming within an exclusion zone for an electrical part do not apply where:

- the person is an authorised or instructed person for the electrical part;
- the electrical part is a low voltage overhead insulated electric line; and
- in the case of operating plant, a safety observer is being used.

6.4 Risk management

This part should be read in conjunction with Part 2 of this Code.

6.4.1 Risk identification

Before carrying out any vegetation management work, the employer or self employed person should identify potential risks of the task. If a risk involving overhead electric lines has been identified, a written assessment should then be conducted to determine the risk to a person (or something he or she is carrying, or something attached to that person) encroaching into the exclusion zone. This step will help to determine the level of associated risk and establish a priority list based on that risk level. A copy of the assessment should be kept for future reference.

Risks to be considered include, but are not limited to, the following:

- Proximity of vegetation and proposed work activity to electric lines. For example:
 - the vegetation involved is located within exclusion zones;
 - that vegetation or part of the vegetation may fall or otherwise be carried into the area within exclusion zones;
 - carrying out the task would cause a person or anything a person may be handling, or in contact with, to intrude into exclusion zones; and
 - wind causing intermittent encroachment of vegetation into the exclusion zone or wet weather making the situation more dangerous.
- Operational characteristics of equipment. Some examples of operational characteristics that may present a risk are:
 - knuckle boom EWP's where convenient placement of the basket can have part of the boom intruding into roadways or other hazardous areas;
 - cutting equipment such as chain saws, which may 'kick back', causing equipment to move inadvertently; and
 - site conditions such as weather (wind), terrain, vehicular and other traffic. For example, heavy traffic on an adjacent roadway could prevent safe access to vegetation.

6.4.2 Risk assessment

If a risk involving overhead electric lines has been identified, a written assessment should then be conducted to determine the risk to a person (or something he or she is handling, or something attached to that person) or plant or equipment coming into contact with electric lines. This step will help to determine the level of associated risk and establish a priority list based on that risk level. A copy of the assessment should be kept for future reference.

The following factors may be included in a risk assessment:

- voltage of the exposed live part e.g. electric line;
- height of the lines;
- whether the lines are insulated or bare;
- proximity of vegetation;
- insulating properties of the tools (devices) and whether the devices have been tested and found to be electrically safe;
- heights of any tools, equipment or machinery to be used, placed or operated near the line;
- size of equipment being operated near the line and the equipment's operating characteristics, ease of manoeuvrability and conductivity;
- location of overhead electric line supporting structures such as poles and towers in relation to the work to be performed e.g. vegetation may have attached itself to a pole;
- particular arrangement of supporting structures, e.g. there may be stay wires that are hard to see;
- unexpected movement of the terrain, ground or surface upon which the equipment or plant is located, perhaps resulting in a corresponding surge or sudden movement of the load towards live electric lines;
- prevailing weather e.g. strong wind or water affecting the movement of the plant or its parts; and
- visibility of the overhead lines and their associated support structures, such as poles, and particularly stay wires on poles.

6.4.3 Deciding on risk treatment measures

This step involves deciding on measures to eliminate the risk entirely or minimise the risk of injury or property damage that may result. The preferred risk treatment hierarchy is:

A. Eliminate the risk.

This could involve de-energising the line during the work or re-routing the service line away from the work area. De-energising or moving powerlines should be arranged as soon as possible because, depending on the circumstances, it may take some time to arrange. See part 4, division 3, of the Regulation with regard to consultation with persons in control of electric lines.

B. If elimination of the risk is not possible, select these risk treatment measures in the following order of preference:

- (i) **Substitute with a less risky material, process or equipment.** This could mean, for example, using non-conductive equipment or tools designed to reduce the possibility of direct contact with the overhead electric lines. Non-conductive scaffolding instead of metal scaffolding could be used. It could also mean having someone else do the work. If the line is the property of the electricity entity, have the entity undertake the work.
- (ii) **Isolate the risk.** This could mean that the person clearing the vegetation stays outside the exclusion zone. Clearing operation would cease where persons, trees or equipment were in danger of coming into the exclusion zone.
- (iii) **Redesign equipment or work process.** For example this could involve using insulated fibreglass extension handles on loppers, instead of a conductive aluminium extension handles.
- (iv) **Introduce administrative risk treatment measures.** This includes planning and documenting the work procedure before starting work or using a safety observer to warn people before they encroach into the exclusion zones. A physical administrative measure could be to use visible markers, such as 'tiger tails' installed on electric lines and stay wires to make them easier to see and locate. Tiger tails do not insulate wires.
- (v) **Use appropriate personal protective equipment.** This includes the use of effectively electrically tested insulating gloves by anyone who may be at risk of encroaching into the exclusion zones.

In deciding which treatment measure to adopt, you should start at the top of the risk treatment hierarchy and work your way down.

6.4.4 Implement risk treatment measures

In implementing risk treatment measures, you should develop an implementation plan that:

- specifies the preferred treatment options;
- sets out the steps that need to be taken to implement the treatment measures;
- identifies and allocates the resources necessary to implement the treatment measures (i.e. time and expenses);
- allocates responsibilities and accountabilities (i.e. who does what and when);
- sets the timeframe for implementation (i.e. when it is to be completed by); and
- sets a date for reviewing the treatment measures.

6.4.5 Monitor and review

In monitoring and reviewing the effectiveness of risk treatment measures, it may be necessary to modify the measures or the way they were implemented.

6.4.6 Entity obligation to manage vegetation

Under section 148 of the Regulation an electricity entity must ensure that trees and other vegetation are trimmed, and other measures taken, to prevent contact with an overhead electric line forming part of its works that is likely to cause injury from electric shock to any person or damage to property.

6.4.7 Person in control obligation to manage vegetation

Under section 75 of the Regulation, the person in control of an overhead electric line (not including an overhead electric line owned by an electricity entity) must ensure that trees and other vegetation are trimmed, and other measures taken, to prevent contact with the line that is likely to cause injury from electric shock to any person or damage to property.

Part 7 : Agricultural work near overhead electric lines

7.1 Scope

This part is for agricultural workers working near exposed live parts such as overhead electric lines. Examples of such work include:

- handling irrigation pipes under or near an overhead electric line;
- using lifting or elevating plant or equipment such as grain augers, hay bale elevators, travelling irrigators or harvesters near or under an overhead electric line; or
- any other work that involves the risk of a person or anything attached to or held by a person, coming into contact with overhead electric lines.

Please refer to Appendix C for examples/case studies of work near overhead electric lines.

7.2 Exclusion zones

Exclusion zones and regulatory requirements for all live electric lines are described in Part 3 of this Code.

Exclusion zones vary according to the voltage and the type of overhead powerlines. The actual distances are set out in schedule 2 of the Regulation and in Appendix B of this Code.

A person must not work in situations where the following are at, or within, the exclusion zones for the electric line:

- any part of operating plant being operated; or
- any hand tools or other equipment or load being handled by any person involved with the operation.

7.3 Risk management process for agricultural work near overhead electric lines

This part should be read in conjunction with Part 2 of this Code. See also Appendix C for case studies that help illustrate the risk management process.

7.3.1 Risk identification

Before carrying out any agricultural work near overhead electric lines, a person should identify potential risks of the task. If a risk involving overhead electric lines has been identified, a written assessment should then be conducted to determine potential risks relating to a person or plant encroaching into the exclusion zone. This step will help to determine the level of associated risk and establish a priority list based on that risk level. A copy of the assessment should be kept for future reference.

Risks for agricultural work near exposed live parts relate mainly to live overhead electric lines when people are:

- working nearby and in the process may come into contact with signs, scaffolding or machinery such as augers and elevating work platforms near electric lines;
- moving or rearranging long aluminium irrigation pipes; or
- operating high machinery or machinery with height changeable attachments in paddocks where electric lines exist.

7.3.2 Risk assessment

If a risk involving overhead electric lines has been identified, a written assessment should then be conducted to determine the risk to a person (or something he or she is carrying, or something attached to that person) or plant or equipment coming into contact with electric lines. This step will help to determine the level of risk associated with the identified risks and establish a priority list based on that risk level. A copy of the assessment should be kept for future reference.

The following factors may be included in a risk assessment:

- voltage of the exposed live part e.g. electric line;
- height of the lines;
- whether the lines are insulated or bare;
- heights of any tools, equipment or machinery to be used, placed or operated near the line;
- size of equipment being operated near the line and the equipment's operating characteristics, ease of manoeuvrability and conductivity;
- proximity of stationary or fixed plant and equipment to overhead lines, e.g. grain silos and stock crate gantries;

- location of overhead electric line supporting structures such as poles and towers in relation to the work to be performed e.g. a pole may be located where a large self propelled machine, such as a harvester, is required to reverse or turn;
- the possibility of sway and sag of the overhead powerlines (sway of overhead powerlines is usually caused by wind, while sag may vary as temperatures vary);
- particular arrangement of supporting structures, e.g. there may be stay wires that are hard to see;
- unexpected movement of the terrain, ground or surface upon which the equipment or plant is located, perhaps resulting in a corresponding surge or sudden movement of the load towards live electric lines;
- prevailing weather e.g. strong wind or water affecting the movement of the plant or its parts; and
- visibility of the overhead lines and their associated support structures, such as poles, and particularly stay wires on poles.

7.3.3 Deciding on risk treatment measures

This step involves deciding on measures to eliminate the risk entirely or minimise the risk of injury or property damage that may result. The preferred risk treatment hierarchy is:

A. Eliminate the risk. This could mean:

- de-energising the lines;
- having electric lines installed underground; or
- relocating plant or equipment such as a silo away from the vicinity of electric lines.

Note: Arrangements for de-energising and re-routing lines should be made with the electricity entity as early as possible when planning work. The de-energising process can take some time and depending on the circumstances, may delay work. Where powerlines have been de-energised, confirmation should be sought from the person in control of the power line.

B. If elimination of the risk is not possible, select these treatment measures in the following order of preference:

- (i) **Substitute with a less risky material, process or equipment** could mean using another means to perform the task. For example, instead of using a truck-mounted auger to fill an above ground silo located near or directly under overhead electric lines, you could use a pressure tanker, filling the silo through a ground-level filler pipe on the silo. This alternative would eliminate the risk of touching overhead lines.
- (ii) **Isolate the risk** could mean erecting a physical barrier to prevent any part of the plant or equipment encroaching into the exclusion zone. A physical barrier should consist of a non-conductive material such as wood or plastic or alternatively correctly earthed metal and be strong enough to withstand any impact from falling objects or loose materials. Before any barriers are erected, a risk assessment must be carried out by an appropriately qualified person to ensure the appropriate design and correct materials are used. The barrier must be erected safely. This may entail isolating the electricity supply while the barrier is installed.
- (iii) **Redesign equipment or work process** could involve the use of limiting devices to prevent equipment from entering the exclusion zones. If a limiting device is used, the interlocking or warning system should be designed to 'fail safe' or should at least meet category 4 reliability in accordance with AS4024.1 or EN954-1. Where the limiting device prevents movement, sudden stopping or the momentum of the load should be catered for.
- (iv) **Introduce administrative risk treatment measures** includes using a safety observer to warn the operator of plant or equipment whenever there is danger of entering the exclusion zones. A physical administrative measure could be to use visible markers, such as 'tiger tails' installed on electric lines and stay wires to make them easier to see and locate. Tiger tails do not insulate wires.
- (v) **Use appropriate personal protective equipment** includes the use of effectively maintained insulating gloves by anyone who may have to come into contact with any conducting part of the crane, plant or load.

In deciding which treatment measure to adopt, you should start at the top of the risk treatment hierarchy and work your way down.

7.3.4 Implement risk treatment measures

In implementing risk treatment measures, you should develop an implementation plan that:

- specifies the preferred treatment options;
- sets out the steps that need to be taken to implement the treatment measures;
- identifies and allocates the resources necessary to implement the treatment measures (i.e. time and expenses);
- allocates responsibilities and accountabilities (i.e. who does what and when);
- sets the timeframe for implementation (i.e. when it is to be completed by); and
- sets a date for reviewing the treatment measures.

7.3.5 Monitor and review

In monitoring and reviewing the effectiveness of risk treatment measures, it may be necessary to modify the measures or the way they were implemented.

7.4 Particular circumstances

Despite the earlier provisions, where plant or equipment consists of a vehicle, possibly including an attached trailer; the plant or equipment may be driven under an overhead electric line only under the following circumstances:

- the plant or equipment has a fully-enclosed driver's cabin;
- the driver remains completely within the cabin;
- a clearance between the plant or equipment not exceeding those in Appendix B is maintained at all times;
- no other person is in or on the plant or equipment or in contact with the plant or equipment or at risk of encroaching within the exclusion zone of the live exposed parts; and
- moving/extendable parts to be retracted and secured.

Part 8: Transportation of high loads near electric lines

8.1 Scope

This part has been drawn up for road transport operators exposed to the risk of contacting live exposed parts e.g. when moving a high load with a vehicle near electric lines of an electricity entity. The part provides guidance on responsibilities and safe procedures to these operators, their workers and others.

Apart from electrical risks, there may be other obstacles or risks associated with transporting such loads e.g. clearance from trees and traffic lights. This Code does not cover such risks. This Code also does not cover permits and other requirements in relation to the transport of over dimension loads from other authorities e.g. local council, Queensland Rail, or Queensland Transport.

8.1.1 Legislative requirements

Persons performing electrical or non-electrical work must not encroach into the exclusion zones for the particular circumstances as detailed in section 62 of the Regulation.

8.2 Meaning of particular terms used in this part

(a) Assessing

Checking the suitability of, and the requirements necessary for, safe transport of a proposed high load by reference to the electricity entity's records. If this is not possible, scoping should be undertaken.

(b) Escorting

Facilitating safe passage of a high load through a electricity entity's network, including any activities necessary to achieve safety.

(c) Escort service provider

A person or company providing services to escort a vehicle in accordance with a electricity entity's electrical safety precautions.

(d) Notification

Road transport operator's advice to the electricity entity of the intended route and specification of a high load.

(e) Road transport operator (RTO)

A person or company transporting a load more than 4.6 metres high.

(f) Scoping

Checking the suitability of, and the requirements necessary for, safe transport of a proposed high load by physically checking the intended route. Allowances should be made for changes in the road profile e.g. dips and the distance between front and rear wheel axles. (Refer to Figure 3 for an example of a problem caused by changes to the road profile.) Scoping may not be required where the suitability for transporting a high load over a particular route can be determined by assessment.

(g) Scoping service provider

An electricity entity, a person or a company who carries out scoping or assessing in accordance with an entity's high load safety precautions.

(h) Qualified person

A person who has successfully completed a high load transportation scoping course or its equivalent provided or authorised by an electricity entity. The evaluation of the person's qualification will be made by the relevant electricity entity.

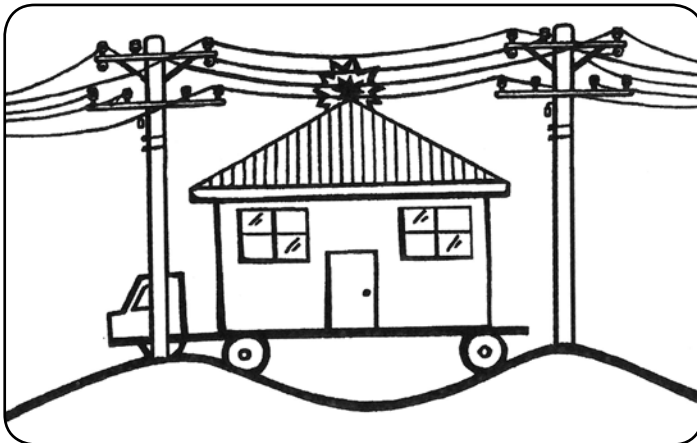


Figure 3: Illustration on how a dip in the road profile can affect the clearance height of over dimension loads

8.3 Transport requirements for high load categories

Electricity entities have certain requirements that must be met before high loads can be moved with a vehicle near electric lines of an electricity distribution network. The rest of Part 8 is devoted to these requirements.

8.3.1 What is a high load and what requirements apply?

There are four categories of high load. The transport requirements of high loads depend on the height of the load above the roads. Three of these categories have special requirements.

Categories and requirements are set out in Table 2 below.

Table 2: Categories and requirements for high loads being transported

Category No.	Maximum Transport Height of Load Above Road	Transport Requirements
1	Up to 4.6 metres	Transport can be carried out without any notification.
2	Over 4.6 metres, but not exceeding 5.0 metres	<ul style="list-style-type: none"> • Notification to the electricity entity is required. • The route shall be scoped / assessed by a qualified person taking into account the entity's advice about the network including information in the notification and any safety advice. • Generally no escorting will be required, depending on the outcome of scoping / assessment.
3	Over 5.0 metres, but not exceeding 5.5 metres	<ul style="list-style-type: none"> • Notification to the electricity entity is required. • The route should be scoped / assessed by a qualified person taking into account the electricity entity's safety advice. • An escort may be required in accordance with the electricity entity's requirements or depending on outcome of scoping/assessment.
4	Exceeding 5.5 metres	<ul style="list-style-type: none"> • Notification to the electricity entity is required. • The route should be scoped / assessed by a qualified person taking into account the electricity entity's advice about the network and any safety precautions advised by the network. • An escort is required.

Category 1 (height of 4.6m or less): Transport can be carried out without any notification to the electricity entity.

Category 2, 3, 4: Notification must be forwarded to the electricity entity. Notification about transporting a high load should contain the following:

- Dimensions of the load. The maximum travel height of the load should be determined by combining the height of the object and the vehicle used for transportation. If unable to predetermine the exact measurement, the maximum possible height should be used for scoping or assessing purposes.
- Route specification.
- Time or times during which transport is required to take place.
- Details of the service provider responsible for facilitating the transport of the high load and providing safety precautions.

Copies of the notification form can be obtained directly from the electricity entity or their website.

8.4 Responsibilities – electrical safety

8.4.1 Electricity entity

The electricity entity's responsibilities regarding transport of high loads include:

- provide relevant electricity network information to transport operators and escort service providers;
- advise precautions for scoping/assessing high loads and escorting high loads, which address the electricity risks of these activities; and
- provide authorisation in writing.

8.4.2 Escort service provider – electrical safety

The escort service provider's responsibilities in relation to the transport of high loads include:

- understand exclusion zone concepts and their application;
- ensure that only persons with appropriate training are engaged to perform relevant activities associated with escorting the high load;
- inform the electricity entity if load and route do not conform to the notification details;
- use only specialised equipment, especially where the equipment may and can come into contact with exposed live parts;
- notify electricity entity of operational electrical safety problems that have been identified e.g. damage to network assets; and
- direct road transport operators to ensure electrical safety is maintained.

8.4.3 Road transport operator (RTO) – electrical safety

Road transport operators' responsibilities in relation to the transport of high loads include:

- notify the electricity entity of the intention to move a high load near network assets;
- provide accurate information about high loads to electricity entity;
- comply with precautions required by the electricity entity;
- comply with directions of escort provider; and
- where an escort service provider is not required, the RTO must contact the electricity entity about operational matters affecting electricity safety.

An example of an operational matter, which would affect electrical safety, would be if the high load transport encountered electric lines lower than the minimum clearance prescribed in the regulation. See section 139 and schedule 4(1) and (3) of the Regulation.

8.4.4 Scoping service provider or network assessor – electrical safety

The scoping service provider's or network assessor's responsibility in relation to the transport of high loads is to provide accurate information about the network through which the high load is to be transported.

Part 9 : Installation, maintenance or repair of electrical equipment

9.1 Scope

This part applies to electrical work on any installation, equipment, machinery, plant or appliance, where there is a risk of contact with exposed live electrical parts. Examples of such work include:

- installing or testing circuits on a switchboard adjacent to exposed live electrical parts;
- replacing a mechanical component of an electrical appliance, such as a water hose in an electric dishwasher where live electrical parts are exposed in the process; and
- repairing, replacing, adjusting or calibrating hydraulic components of industrial machinery where access to the hydraulic component imposes risk of contact with exposed live parts of machinery.

Please refer to Appendix C for examples/case studies of repair of electric equipment.

In many circumstances, the risks associated with undertaking electrical work near exposed live parts can be equivalent to those associated with live electrical work. Evaluation of the risks and development of risk treatment measures as described in Part 5 of the *Electrical Safety Code of Practice 2010 - Risk Management* will provide further assistance in developing safe work practices.

9.2 Risk management

This part should be read in conjunction with Part 2 of this Code.

9.2.1 Risk identification

Before carrying out electrical work as described above, the employer or self employed person should identify potential risks of the task. If a risk involving the electrical work has been identified, a written assessment should then be conducted to determine the risk to a person. This step will help to determine the level of associated risk and establish a priority list based on that risk level. A copy should be kept for future reference.

Risks to be considered but not limited to:

- live parts;
- exposed high temperature parts; or
- moisture entering the electrical device.

9.2.2 Risk assessment

If a risk involving electricity has been identified, a written assessment should then be made to determine the associated risk of injury or property damage. This step will help to establish the risk level and decide on appropriate treatment measures. A copy of this assessment should be kept for future reference.

Risks include:

- electric shock, if live parts are touched;
- explosion. e.g. if a metal tool were dropped onto bus bars, causing a short circuit;
- exposed high-temperature parts causing burns to bare skin e.g. the normal surface temperature of some electric motors can cause burns if touched by bare skin; and
- electrical fires, e.g. allowing moisture or dust to enter an electrical device; resultant tracking and arcing could induce a fire.

The following factors may be taken into account in a risk assessment:

- type of work being carried out and tools or equipment used;
- proximity of the work to live parts;
- the types of tools and equipment used in the work, for example, the conductive nature of tools;
- environmental conditions such as confined space, wet surfaces or unfavourable weather when urgent repairs must be done;
- assessing the need to repair equipment while it remains energised e.g. cleaning a low voltage switch room; and
- work that may impose additional risks e.g. welding or grinding that could damage adjacent electrical lines or apparatus.

9.2.3 Deciding on risk treatment measures.

This step involves deciding on treatment measures to eliminate the risk or minimise the risk of injury or property damage that may result. The preferred risk treatment hierarchy is:

A. Eliminate the risk.

This could mean electrically isolating the equipment or installation before starting work. When disconnecting the installation or equipment from supply, a method should be applied to ensure the equipment is not reconnected while the work is undertaken. For example, you could place the plug in a lockable enclosure. If equipment is connected to supply by fixed wiring, suitable means of isolation may include padlocking, or lockable enclosures, or warning notices. If an isolator has a warning notice attached as the means of preventing re-energisation, anyone who has access to the isolator should be trained in the safety requirements of circuit isolation and the workplace's warning notice system. The isolation process should be well documented so that everyone involved knows exactly what to do.

B. If elimination of the risk is not possible, select these treatment measures in the following order of preference:

- (i) **Substitute with a less risky material, process or equipment** could mean, for example, replacing instead of repairing a faulty part. This could mean shorter downtime and not having to work live, lessening or eliminating the risk of exposure.
- (ii) **Isolate the risk** could mean erecting a physical barrier to prevent any contact with electrical risk, directly or indirectly. A physical barrier should consist of a non-conductive material such as wood or plastic or, alternatively, correctly earthed metal, and be strong enough to withstand any impact from falling objects or loose materials. Before any barriers are erected, a risk assessment must be carried out by an appropriately qualified person to ensure the appropriate design and correct materials are used. The barrier must be erected safely. This may entail isolating the electricity supply while the barrier is installed.
- (iii) **Redesign equipment or work process** could involve designing and installing equipment that does not have live parts near the work area.
- (iv) **Use appropriate personal protective equipment (PPE)** includes the use of insulating gloves.

In deciding which risk treatment measure to adopt, you should start at the top of the risk treatment hierarchy and work your way down.

9.2.4 Implement risk treatment measures

In implementing risk treatment measures, you should develop an implementation plan that:

- specifies the preferred risk treatment options;
- sets out the steps that need to be taken to implement the treatment measures;
- identifies and allocates the resources necessary to implement the measures (i.e. time and expenses);
- allocates responsibilities and accountabilities (i.e. who does what and when);
- sets the timeframe for implementation (i.e. when it is to be completed by); and
- sets a date for reviewing the risk treatment measures.

9.2.5 Monitor and review

In monitoring and reviewing the effectiveness of risk treatment measures, it may be necessary to modify the measures or the way they were implemented.

Part 10 : Work near electrical risks in buildings and near underground electrical services

10.1 Scope

This part applies to any work in buildings and near electrical installation or underground electrical services that involves risk of contact with exposed live parts.

Examples of such work include:

- a builder removing a sheet of plasterboard from a stud wall and thus creating a risk of contact with exposed live parts e.g. an electrical accessory such as a socket outlet;
- a plumber cutting a water pipe in a building where there could be an electrical cable next to the water pipe; and
- a fencing contractor digging holes where an electrical cable could be a buried.

Please refer to Appendix C for examples/case studies of work near these electrical risks.

10.2 Risk management

This part should be read in conjunction with Part 2 of this Code.

10.2.1 Risk identification

Before carrying out any work near electrical risks in buildings and near underground electrical services, a person should identify any potential risks of the work. Sections 62A, 62C and 62D of the Regulation set down the requirements for a principal contractor at a construction site or an employer or self employed person whether at a construction site or not to find out from appropriate sources what underground electrical services could create a risk if contacted or damaged. This information must be taken into consideration when planning work. A written record of this information should be kept.

If a risk has been identified, a written assessment should then be conducted to determine the risk to a person, (or something he or she is carrying or something attached to that person) coming into contact with live an electrical risk in a building or an underground electrical service.

Risky situations to be considered include, but are not limited to, the following:

- Any electric lines or apparatus installed in building cavities that may become accessible when:
 - a part of the building covering the cavity has been removed; or
 - work is being carried out in the building cavity.
- Conductive material or fixings may inadvertently contact live parts e.g. metallic sarking or metallic thermal insulation being installed in or removed from a building.
- Work activities that could involve risk of damage to electric line or cables e.g. drilling or sawing.
- Work done in a building or structure where the existence of electric lines and apparatus is not known.
- Excavating or driving implements into the ground (e.g. star pickets) where underground services may be located.

10.2.2 Risk assessment

Where a risk has been identified, a risk assessment should then be conducted to determine the risk to a person (or something he or she is carrying, or something attached to that person) being exposed to an electrical risk in a building or an underground electrical service.

The assessment should consider:

- The risk of tools damaging cables or apparatus, for example:
 - when digging, driving equipment or excavating where buried electrical cables may be present;
 - when demolishing part or whole of a building; and
 - when installing a building component or material e.g. using screws to fix a bracket to a wall where the screw could penetrate a cable installed behind the wall surface.
- The risk of cables or apparatus being concealed in a work location:
 - If it is not known whether cables, conduits, apparatus or situations form an electrical safety risk, you should either assume that the risk exists, or have a qualified person investigate and report.

- If excavating in a public place, suitable means must be used to identify any electrical cables that could be present. Suitable means may include:
 - (i) Call Dial Before You Dig, a free enquiry service for information on underground assets anywhere in Australia. This organisation will advise if electrical cables owned by one or more of its contributory members are located near your worksite. In addition, definite cable locations can be determined by special arrangement with the organisations. For further information, contact Dial Before You Dig by any of the following methods:
 - phone 1100; or
 - submit an enquiry online at www.dialbeforeyoudig.com.au.
 - (ii) Contact relevant authorities about any cables they may have placed near the excavation. Authorities may include:
 - (a) electricity entities such as Energex or Ergon;
 - (b) communication companies such as Optus and Telstra;
 - (c) local government authorities; and
 - (d) water authorities.

In some instances, customers of electricity entities have authority to place electricity cables in public places. If excavating on private property, you should first contact the owner or occupier of the premises about buried cables.

10.2.3 Deciding on risk treatment measures

This step involves deciding on treatment measures to eliminate the risk or minimise the risk of injury or property damage that may result. Where the risk is not known, it must be assumed that an electrical risk could exist. For example, if you cannot determine exactly where an underground cable is, you should dig carefully to avoid accidental damage. This may mean digging only by hand. Where the risk is known – for example, where an electrical conduit contains a live low voltage circuit and there is a risk the conduit could be cut or scraped with a power tool – suitable precautions should be taken. This may mean using hand tools instead of power tools.

The preferred risk treatment hierarchy is:

A. Eliminate the risk.

This could mean having the electricity supply to the circuit isolated. Sometimes, when many cables and circuits come from a switchboard, identifying the isolation point for a particular cable is not easy. You should engage a qualified person

to do the isolation work. For example, if the work involves building demolition and isolating supply is the risk treatment measure, it may be necessary to have the electricity entity disconnect the supply. De-energising power lines should be arranged as soon as possible because depending on the circumstances, it may take some time to arrange. See part 4, division 3, of the Regulation with regard to consultation with persons in control of electrical lines.

B. If elimination of the risk is not possible, select these risk treatment measures in the following order of preference.

- (i) **Substitute with a less risky material, or use of a different process or equipment.** Instead of welding a bracket to a column, which may result in excessive heat and damage to adjacent electrical cable, during the welding process, consider bolting the bracket to the column. It could also mean hiring a person with the relevant electrical qualification to do the job.
- (ii) **Isolate the risk.** This could mean using a physical barrier to prevent accidental contact between a hand-held tool (e.g. grinder) and the exposed live parts in the wall. A physical barrier should consist of a non-conductive material such as wood or plastic or alternatively correctly earthed steel and be strong enough to withstand any impact from falling objects or loose materials. Before any barriers are erected, a risk assessment must be carried out by an appropriately qualified person to ensure the appropriate design and correct materials are used. The barrier must be erected safely. This may entail isolating the electricity supply while the barrier is installed.
- (iii) **Redesign equipment or process.** This may mean using a less intrusive method of carrying out the activity. For example when cutting a hole for a door through an existing stud and plaster wall, scoring and breaking the plaster rather than sawing it through will reduce the risk of damage to any cables, which may be in the wall.
- (iv) **Use administrative risk treatment measures.** This may include an authorisation and training regime to identify the risks and perform the work safely.
- (v) **Use appropriate personal protective equipment.** This includes the use of effectively electrically tested insulating gloves and/or fire retardant clothing.

10.2.4 Implement risk treatment measures

In implementing treatment measures, you should develop an implementation plan that:

- specifies the preferred treatment options;
- sets out the steps that need to be taken to implement the treatment measures;
- identifies and allocates the resources necessary to implement the treatment measures (i.e. time and expenses);
- allocates responsibilities and accountabilities (i.e. who does what and when);
- sets the timeframe for implementation (i.e. when it is to be completed by); and
- sets a date for reviewing the treatment measures.

10.2.5 Monitor and review

In monitoring and reviewing the effectiveness of treatment measures, it may be necessary to modify the measures or the way they were implemented.

10.2.6 Notes on cable identification

Electric lines and cables are manufactured in many different ways. Not all cables are covered with thermoplastic sheath, although these are common and often well known in the building industry.

Electrical cables have different shapes and appearances. For example, cables can be circular, oval, flat, or ribbed in cross section. These cables can also be of any colour.

Some electric cables consist of a copper sheath with copper conductors within the sheath and a mineral insulation separating the conductors and sheath. These cables look and feel identical to copper water pipe or gas pipe. Cables of this kind could also be made of other metals such as stainless steel and aluminium.

Cables in buildings and structures can operate at low or high voltages e.g. cables supplying a transformer in a building may be energized at 11,000 volts (11kV).

Some installed cables may be exposed but others may be concealed in many ways, for example:

- in wall, floor and ceiling cavities;
- behind joinery such as skirting boards and pelmets; and

- in structural parts of buildings such as hollow steel studs and supporting columns.

Electrical conduits are often made of different materials and constructed differently. Examples include:

- PVC rigid conduit from 16mm or 5/8 inch outside diameter (OD) to 150mm or 6 inch OD is generally light grey; if the conduit is heavy duty and suitable for underground use, it may be orange (PVC conduit for protection against high temperatures is black);
- PVC flexible conduit or flexible hose;
- PVC corrugated conduit;
- screwed metal conduit, generally made from galvanized steel;
- split metal conduit (obsolete but still widely used) and generally painted black;
- cable trunking, rectangular or square in cross section, and in a wide range of sizes, made of steel or plastic; and
- cable tray, generally galvanized steel in a wide range of sizes and styles.

Appendix A: Meaning of terms used in this Code

‘authorised person’, for an electrical part (see section 59 of the Regulation), means a person who:

- (a) has enough technical knowledge and experience to do work that involves contact with, or being near to, the electrical part; and
- (b) has been approved by the person in control of the electrical part to do work that involves contact with, or being near to, the electrical part, or is authorised to act for the person in control of the electrical part.

Cathodic protection system means a system by which a structure in contact with ground or water is protected from electrolytic corrosion by a direct electric current flowing between the structure and an electrical conductor through the ground or water.

Chief Executive is the Director-General of the Department of Justice and Attorney-General, Queensland.

Competent person means a person who has acquired, through training, qualifications, experience or a combination of these, the knowledge and skills to do the task and in a safe way, including knowledge of:

- (i) relevant Australian Standards;
- (ii) relevant codes of practice; and
- (iii) other relevant legislation.

What is construction work:

- (1) Work is **construction work** if it is:
 - (a) work to erect, construct, extend, alter, convert, fit-out, commission, renovate, repair, refurbish, disassemble or decommission a structure, or part of a structure;
 - (b) work connected with site preparation, excavation and landscaping for work mentioned in paragraph (a);
 - (c) the assembly or installation of prefabricated components to form a structure, or part of a structure, for work mentioned in paragraph (a);
 - (d) the disassembly of prefabricated components for work mentioned in paragraph (a) that, immediately before the disassembly, formed a structure or part of a structure; or
 - (e) an activity that is a prescribed activity.

- (2) Work is **not construction work** to the extent it is carried out at a workplace, as part of a business or undertaking, if the work is to erect or construct a structure that, when erected or constructed, is intended to be transported to another place.

Example of what is not construction work:

- construction of a manufactured home or prefabricated building.
- (3) Construction work is taken to stop:
- (a) when the construction work at the workplace where the construction work is being performed ends and possession of the workplace is returned to the client; or
 - (b) if the client remains in possession of the workplace where the construction work is being performed while the work is performed, when the construction work at the workplace ends.

Construction workplace means:

- (a) a workplace where construction work is performed, if the construction work:
 - (i) is a prescribed activity; or
 - (ii) is not a prescribed activity and the estimated final price for the construction work is more than \$80000; or
- (b) a place intended to become a construction workplace under paragraph (a) when work starts at the place.

Crane means a machine for raising or lowering (luffing) a load and moving it horizontally (slewing). It includes any type of crane, including an elevating work platform, whether independent or an integral part of another piece of equipment. This definition includes an agricultural tractor, or any other apparatus used or capable of being used for raising, lowering, handling or transporting materials or equipment in a similar manner. The definition also includes any supporting structure and any other equipment ancillary to the use of the crane or apparatus, but excludes any grab crane or floating crane.

A **mobile crane** means a machine that:

- (a) is used primarily for raising or lowering a freely suspended load;
- (b) is capable of travelling over a supporting surface without the need for fixed runways (including railway tracks); and

- (c) relies only on gravity for stability, with no vertical restraining connection between itself and the supporting surface, and no horizontal restraining connection (other than frictional forces at supporting-surface level) that may act as an aid to stability.

A **tower crane** means a crane with a boom that is mounted on a tower structure and includes self-erecting tower cranes.

Direct contact (see section 60 of the Regulation):

- (1) A person is in **direct contact** with an electrical part if:
 - (a) the person is touching the electrical part with the person's bare hands or another part of the person's body;
 - (b) the person is touching a conductive object with the person's bare hands or another part of the person's body, and the conductive object is touching the electrical part;
 - (c) an article of clothing worn by the person is touching the electrical part; or
 - (d) an article of clothing worn by the person is touching a conductive object, and the conductive object is touching the electrical part.
- (2) Operating plant is in **direct contact** with an electrical part if:
 - (a) any part of the operating plant is touching the electrical part; or
 - (b) anything the operating plant is handling is touching the electrical part.
- (3) A vehicle is in **direct contact** with an electrical part if:
 - (a) any part of the vehicle is touching the electrical part; or
 - (b) anything being carried or otherwise handled by the vehicle is touching the electrical part..

Earthed means connected to the general mass of the earth (see schedule 9 of the Regulation).

Earth moving machine: any item of plant used for excavating, transporting, unloading compacting or spreading earth, overburden, rubble, spoil, paving material, aggregate or similar material. The term includes backhoes and bulldozers.

Electrical installation (see section 15 of the Act) is a group of items of electrical equipment. However, a group of items of electrical equipment is an electrical installation only if:

- (a) all the items are permanently electrically connected together; and
- (b) the items do not include items that are works of an electricity entity; and
- (c) electricity can be supplied to the group from the works of an electricity entity or from a generating source.

An item of electrical equipment can be part of more than one electrical installation.

For an electrical installation where all the items are permanently electrically connected together:

- (a) an item of electrical equipment connected to electricity by a plug and socket outlet is not permanently electrically connected; and
- (b) connection achieved through using works of an electricity entity must not be taken into consideration for deciding whether items of electrical equipment are electrically connected.

Examples of an electrical installation:

- The switchboard, wiring, lighting, socket outlets and other electrical equipment permanently connected for a house or residential unit.
- The switchboard, wiring, lighting, socket outlets and other electrical equipment permanently connected for a shopping centre. The electrical installation for the shopping centre generally includes the electrical installations for the individual shops.
- The switchboard, wiring, lighting, socket outlets and other electrical equipment permanently connected for a residential unit complex. The electrical installation for the residential unit complex generally includes the electrical installations for the individual residential units.
- The switchboard, wiring, lighting, socket outlets and other electrical equipment permanently connected within a caravan.

Electrical part (see section 59 of the Regulation) means:

- (a) an exposed part; or
- (b) an overhead insulated electric line.

Electrical risk (section 10 of the Act) means the risk to a person of death, shock or injury caused directly by electricity or originating from electricity. It also includes the risk to property of damage caused by a cathodic protection system or loss or damage caused directly by electricity or originating from electricity.

Electrical safety notification

- (1) The chief executive may issue a notification (*electrical safety notification*) that:
- (a) is directed at designers, manufacturers, importers or suppliers generally, or at stated designers, manufacturers, importers or suppliers; and
 - (b) states requirements about the use or supply of stated electrical equipment, or a stated type of electrical equipment, including, if appropriate, requirements about preventing the use or supply of the electrical equipment or type of electrical equipment.

Electrical work (see section 18 of the Act) is the manufacturing, constructing, installing, testing, maintaining, repairing, altering, removing, or replacing of electrical equipment.

Examples of electrical work:

- installing low voltage electrical wiring in a building;
- installing electrical equipment into an installation coupler or interconnector;
- replacing a low voltage electrical component of a washing machine; and
- maintaining an electricity entity's overhead distribution system.

However, the following are not **'electrical work'**:

- (a) Installing or removing electrical equipment by connecting it to electricity, or disconnecting it from electricity, by a plug and socket outlet.
- (b) Repairing or replacing non-electrical components of electrical equipment.

Examples for paragraph (b):

- repairing hydraulic components attached to an electric motor; and
- replacing a drive belt on a washing machine.

- (c) Replacing a component forming part of electrical equipment if the electrical equipment has been designed so that the component is readily and safely able to be replaced by a person without electrical knowledge or skill.

Examples for paragraph (c):

- replacing a fuse; and
 - replacing the bulb in a light fitting.
- (d) Assembling, making, modifying or repairing electrical equipment in a workplace registered under the *Workplace Health and Safety Act 1995*, that is prescribed under a regulation for this paragraph, if that is the principal manufacturing process at the workplace, and arrangements are in place, and are detailed in written form, for ensuring that:
- (i) the work is done safely and competently; and
 - (ii) the equipment is tested to ensure compliance with relevant standards.
- (e) Building, under the supervision of an electricity entity, an overhead electric line on structures that do not already carry an energised overhead electric line.
- (f) Building or repairing ducts, conduits or troughs (channels) where electrical wiring will be or is installed, if:
- (i) the channels are not intended to be earthed;
 - (ii) wiring installed in the channels is not energised; and
 - (iii) the work is done under the supervision of a person licensed to perform electrical installation work.
- (g) Laying, cutting or sealing underground cables that are part of the works of an electricity entity before the initial connection of the cables to an electricity source.
- (h) Recovering underground cables that are part of the works of an electricity entity after disconnection from an electricity source.
- (i) Altering, repairing, maintaining or recovering an overhead electric line that is part of the works of an electricity entity, if the work is performed under the entity's supervision and:
- (i) if the line is not on supports supporting another electric line—the line has been isolated from an electricity source so that the closure of a switch cannot energise the section of the line where work is being done; or

- (ii) if the line is on supports supporting another electric line-both lines have been isolated from an electricity source so that the closure of a switch cannot energise the section of the line where the work is being done or an adjacent section of the other line.
- (j) Erecting structures for the support of electrical equipment.

Examples of structures:

- electric poles and towers.
- (k) Locating, mounting or fixing in place electrical equipment, other than:
 - (i) making or terminating electrical connections to the equipment; or
 - (ii) installing supply conductors that will connect the equipment to a supply of electricity.
- (l) Assisting a licensed electrical worker to perform work on electrical equipment under the direct supervision of the electrical worker, if performing the work does not involve the person directly contacting live electrical equipment.
- (m) Maintaining the structural parts of the electrical traction system on a railway, other than overhead electric lines, that forms part of the works of an electrical entity, if the work is structural work performed under a safe system of work.
- (n) Work performed by a person on electrical equipment if:
 - (i) the electrical equipment is not energised;
 - (ii) the work is prescribed under a regulation for this paragraph; and
 - (iii) it is necessary for the person to perform the work to meet the eligibility requirements for an electrical work licence.

Elevating work platform a telescoping device, scissor device, or articulating device or any combination of those devices used to move and position personnel, equipment and materials to and from or at work locations above or below the support surface.

Exclusion zone (see section 61 of the Regulation):

- (1) The exclusion zone, for a person for an electrical part, or for operating plant or a vehicle for an electrical part, means the distance from the part stated for the person, plant or vehicle in Appendix B.

- (2) For applying Appendix B to a person, the person includes any article of clothing worn by the person, and any conductive object the person is handling.
- (3) For applying Appendix B to operating plant, the operating plant includes anything the operating plant is handling other than:
 - (a) a person; or
 - (b) a hand held object the person is handling.
- (4) For applying Appendix B to a vehicle, the vehicle includes anything the vehicle is carrying or otherwise handling.
 - (4A) Despite subsections (2) to (4), the person, operating plant or vehicle does not include an object, for example, a tool, that alone or with another object or objects is an extension from the person, operating plant or vehicle if the object:
 - (a) is an insulated device; and
 - (b) the device has been tested and found to be safe for use on and near the electrical part.
- (5) For applying Appendix B to operating plant operated by an authorised person or instructed person who does not have a safety observer or another safe system as required under the schedule, the authorised person or instructed person must be taken to be an untrained person.
- (6) However, the exclusion zone, for an electrical part, for operating plant operated by an authorised person or instructed person for the electrical part, is taken to be the same as the exclusion zone for an authorised person or instructed person for the electrical part if:
 - (a) the operating plant is fitted with a device capable of stopping the operation of the operating plant immediately the operating plant is at the exclusion zone for an authorised person or instructed person for the electrical part; and
 - (b) there is in place a safe system of work for the use of the operating plant; and
 - (c) the safe system of work has been developed in consultation with persons who are broadly representative of industrial organisations of employees whose members commonly operate operating plant of the operating plant's type; and
 - (d) without limiting paragraph (b), the safe system of work ensures the device mentioned in paragraph (a):
 - (i) is operating properly; and
 - (ii) is set for at least the correct exclusion zone distance.

(7) A reference in Appendix B to a vehicle does not include a reference to:

- (a) an aircraft; or
- (b) a vehicle that is operating plant.

Examples for paragraph (b):

- tip truck tipping a load would not be a vehicle for Appendix B; however a tip truck travelling between sites would be a vehicle in Appendix B; and
- a vehicle that includes an elevated work platform being used for clearing vegetation would not be a vehicle for Appendix B; however, when the platform is not being used for clearing vegetation, the vehicle would be a vehicle for Appendix B.

(8) For applying Appendix B to operating plant, a reference to ‘another safe system’ is a reference to a system of work that:

- (a) has been developed in consultation with persons who are broadly representative of industrial organisations of employees whose members commonly operate operating plant of the operating plant’s type; and
- (b) provides, for persons and property, the same level of electrical safety as, or a greater level of electrical safety than, the level of electrical safety provided with a safety observer.

Exposed live part. A part is:

- (a) exposed where it is bare or not effectively insulated or guarded by a fixed barrier or an earthed metal shield; and
- (b) live until it is isolated and proven to be de-energised and not likely to become re-energised; if the part is a high-voltage conductor, it is considered live until it is earthed.

Extra low voltage (see schedule 2 of the Act) means voltage of 50V or less AC RMS, or 120V or less ripple-free DC.

Handling (see section 59 of the Regulation) includes any of the following:

- (a) carrying;
- (b) connected to, whether or not temporarily;
- (c) controlling;
- (d) holding; and
- (e) lifting.

High voltage (see schedule 2 of the Act) means voltage greater than low voltage.

Instructed person (see section 59 of the Regulation) for an electrical part, means a person who is acting under the supervision of an authorised person for the electrical part.

Live work (see schedule 9 of the Regulation) means electrical work performed in circumstances in which the part of the electrical equipment the subject of the electrical work is energised.

Load any substance, material or object being moved, carried, lifted or supported or which is in rotary or vertical motion, in association with a crane or plant. The definition includes persons and equipment located on an elevating work platform.

Low voltage (see schedule 2 of the Act) means voltage greater than extra low voltage, but more than 1000V AC RMS or 1500V ripple-free DC.

Luff means a movement where a crane raises or lowers its jib while carrying a load.

Must: Where the word 'must' is used in this Code, it reflects the fact that a mandatory requirement exists in the Act or Regulation. The only exception to this is in Part 8 of this code 'Transportation of high loads near electric lines' where there are requirements set in place by distribution entities that must be met before a high load can be transported.

Operating plant (see section 59 of the Regulation) means plant being operated for its intended purpose unless the operation of the plant can not materially affect the distance between the plant and any electrical part in relation to which there is an exclusion zone under this part.

Examples of operating plant:

- a tip truck tipping a load;
- a fixed crane operating at a building site;
- a vehicle that includes an elevated work platform being used for clearing vegetation from around overhead electric lines;
- a concrete pumping truck pumping concrete; and
- a harvester with height changeable attachments being used to transfer grain to a truck.

Example of plant that is not operating plant:

- a furniture removal van under an electric line raising or lowering the electrically or hydraulically operated platform located at the rear of the van, if neither the platform nor anything on the platform rises above the roof of the van.

Penalty units: please refer to section 5 of the Penalties and Sentences Act 1992.

Principal contractor for construction work is the person appointed by the client as the principal contractor for the construction. If there is no client for the construction work, the person who commissions the construction work is taken to be the principal contractor for the construction work (WHS Act, section 13).

Safe System of work for live work on a low voltage electrical installation, includes, but is not limited to a system of work that complies with the provisions of AS/NZS4836 (Safe working on low-voltage electrical installations) about ensuring the safety of persons while performing live work.

Safety observer or spotter is a person who has undergone specific training and is competent to perform the role in observing, warning and communicating effectively; and who warns about approach to exclusion zones.

Should: Where the word 'should' is used in this Code, it should be interpreted as meaning a requirement which needs to be equalled or exceeded so that an obligation to be discharged. If this code states that something should be done, the requirement is to do what the code says or do it in a manner which is equal or better (electrically safer) than the Code.

Slew means a movement where a crane turns or swings forcibly to a new position while moving a load.

The Act means the *Electrical Safety Act 2002*.

Tiger tails (Torapoli pipes) are plastic pipe type cable covers, used as a warning to visually indicate the position of overhead power lines or stay wires. Tiger tails do not insulate wires.

The Regulation means the *Electrical Safety Regulation 2002*.

Untrained person (see section 59 of the Regulation), for an electrical part, means a person who is not an authorised person or an instructed person for the electrical part. However, it should be noted from the above definition of exclusion zone that, for applying Appendix B to operating plant operated by an authorised person or instructed person who does not have a safety observer or another safe system as required under the schedule, the authorised person or instructed person must be taken to be an untrained person.

Please note under section 61(5) of the Regulation, for applying schedule 2 to operating plant operated by an authorised person or instructed person who does not have a safety observer or another safe system as required under the schedule, the authorised person or instructed person must be taken to be an untrained person.

Work (see section 59 of the Regulation) means work of any type, whether or not electrical work, other than live work or electrical welding performed in accordance with a safe system of work.

Appendix B: Exclusion zones for electrical parts

These tables are reproductions from schedule 2 of the Regulation.

Part 1: Exclusion zones for exposed parts for UNTRAINED PERSONS and for operating plant and vehicles operated by untrained persons

Nominal phase to phase voltage of exposed part	Untrained person for the exposed part (mm)	Operating plant operated by untrained person for the exposed part (mm)	Vehicle operated by untrained person for the exposed part (mm)
Low voltage (with consultation with person in control of exposed part)	1 000	3 000	600
Low voltage (without consultation with person in control of exposed part)	3 000	3 000	600
Above low voltage, up to 33kV (with consultation with person in control of exposed part)	2 000	3 000	900
Above low voltage, up to 33kV (without consultation with person in control of exposed part)	3 000	3 000	900
Above 33 kV up to 50 kV	3 000	3 000	2 100
Above 50 kV up to 66 kV	3 000	3 000	2 100
Above 66 kV up to 110 kV	3 000	3 000	2 100

Part 1 (continued)

Nominal phase to phase voltage of exposed part	Untrained person for the exposed part (mm)	Operating plant operated by untrained person for the exposed part (mm)	Vehicle operated by untrained person for the exposed part (mm)
Above 110 kV up to 132 kV	3 000	3 000	2 100
Above 132 kV up to 220 kV	4 500	6 000	2 900
Above 220 kV up to 275 kV	5 000	6 000	2 900
Above 275 kV up to 330 kV	6 000	6 000	3 400
Above 330 kV up to 400 kV	6 000	8 000	4 400
Above 400 kV up to 500 kV	6 000	8 000	4 400
Nominal pole to earth dc voltage of exposed part			
+/- 25 kV	3 000	3 000	900
+/- 85 kV	3 000	3 000	2 100
+/- 150 kV	3 000	3 000	2 100
+/- 270 kV	4 500	6 000	2 900
+/- 350 kV	5 000	6 000	2 900
+/- 400 kV	6 000	6 000	3 400

Part 2: Exclusion zones for exposed parts for AUTHORISED AND INSTRUCTED PERSONS and for operating plant and vehicles operated by authorised or instructed persons

Nominal phase to phase voltage of exposed part	Authorised person or instructed person for the exposed part (mm)	Operating plant operated by authorised person or instructed person for the exposed part, with safety observer or another safe system (mm)	Vehicle operated by authorised person or instructed person for the exposed part (mm)
Low voltage (with consultation with person in control of exposed part)	(No exclusion zone prescribed)	1 000	600
Low voltage (without consultation with person in control of exposed part)	(No exclusion zone prescribed)	1 000	600
Above low voltage, up to 33kV (with consultation with person in control of exposed part)	700	1 200	700
Above low voltage, up to 33kV (without consultation with person in control of exposed part)	700	1 200	700
Above 33 kV up to 50 kV	750	1 300	750
Above 50 kV up to 66 kV	1 000	1 400	1 000
Above 66 kV up to 110 kV	1 000	1 800	1 000

Part 2 (continued)

Nominal phase to phase voltage of exposed part	Authorised person or instructed person for the exposed part (mm)	Operating plant operated by authorised person or instructed person for the exposed part, with safety observer or another safe system (mm)	Vehicle operated by authorised person or instructed person for the exposed part (mm)
Above 110 kV up to 132 kV	1 200	1 800	1 200
Above 132 kV up to 220 kV	1 800	2 400	1 800
Above 220 kV up to 275 kV	2 300	3 000	2 300
Above 275 kV up to 330 kV	3 000	3 700	3 000
Above 330 kV up to 400 kV	3 300	4 000	3 300
Above 400 kV up to 500 kV	3 900	4 600	3 900
Nominal pole to earth dc voltage of exposed part			
+/- 25 kV	700	1 200	700
+/- 85 kV	1 000	1 800	1 000
+/- 150 kV	1 200	1 800	1 200
+/- 270 kV	1 800	2 400	1 800
+/- 350 kV	2 500	3 200	2 500
+/- 400 kV	2 900	3 600	2 900

Part 3: Exclusion zones for low voltage overhead insulated electric line for UNTRAINED PERSONS and for operating plant or vehicles operated by untrained persons

Low voltage overhead insulated electric line	Untrained person (mm)	Operating plant operated by untrained person for the electric line (mm)	Vehicle operated by untrained person for the electric line (mm)
With consultation with, and insulation verified by, an authorised person for the electric line	(No exclusion zone prescribed)	1 000	300
Without consultation with, and without insulation verified by, an authorised person for the electric line	3 000	3 000	600

Part 4: Exclusion zones for low voltage overhead insulated electric line for AUTHORISED OR INSTRUCTED persons and for operating plant or vehicles operated by authorised or instructed persons

Low voltage overhead insulated electric line	Authorised person or instructed person for the electric line (mm)	Operating plant operated by authorised person or instructed person for the electric line, with safety observer or another safe system (mm)	Vehicle operated by authorised person or instructed person for the electric line (mm)
With consultation with, and insulation verified by, an authorised person for the electric line	(No exclusion zone prescribed)	(No exclusion zone prescribed)	(No exclusion zone prescribed)
Without consultation with, and without insulation verified by, an authorised person for the electric line	(No exclusion zone prescribed)	(No exclusion zone prescribed)	600

Part 5: Exclusion zones for high voltage overhead insulated electric line for UNTRAINED PERSONS and for operating plant or vehicles operated by untrained persons

Nominal phase to phase voltage of high voltage overhead insulated electric line	Untrained person for the electric line (mm)	Operating plant operated by untrained person for the electric line (mm)	Vehicle operated by untrained person for the electric line (mm)
Above low voltage, up to 33kV (with consultation with person in control of electric line)	2 000	3 000	900
Above low voltage, up to 33kV (without consultation with person in control of electric line)	3 000	3 000	900
Above 33 kV up to 50 kV	3 000	3 000	2 100
Above 50 kV up to 66 kV	3 000	3 000	2 100
Nominal pole to earth dc voltage of electric line			
+/- 25 kV	3 000	3 000	900
+/- 85 kV	3 000	3 000	2 100

Part 6: Exclusion zones for high voltage overhead insulated electric line for AUTHORISED AND INSTRUCTED persons and for operating plant and vehicles operated by authorised or instructed persons

Nominal phase to phase voltage of high voltage overhead insulated electric line	Authorised person or instructed person for electric line (mm)	Operating plant operated by authorised person or instructed person for electric line, with safety observer or another safe system (mm)	Vehicle operated by authorised person or instructed person for electric line (mm)
Above low voltage, up to 33kV (with consultation with person in control of electric line)	700	700	700
Above low voltage, up to 33kV (without consultation with person in control of electric line)	700	700	700
Above 33 kV up to 50 kV	750	750	750
Above 50 kV up to 66 kV	1 000	1 000	1 000
Nominal pole to earth dc voltage of electric line			
+/- 25 kV	700	700	700
+/- 85 kV	1 000	1 000	1 000

Appendix C: Case studies of working near exposed live parts – incidents and scenarios

Introduction

This part gives a variety of examples to illustrate the risk management process and bring together the practical advice of this Code. The examples created here highlight parts of this Code that can be used to manage risks of working near exposed live parts to meet electrical safety obligations and avoid death, serious injury and damage to property.

C.1 Case 1: Incident - mobile crane operation

A mobile crane came into contact with 132,000 volt overhead power lines that were located adjacent to a worksite. At the time of the incident the crane driver had slewed the boom of the crane towards the overhead power lines, which resulted in the lifting chains swinging outwards, making contact with the power line.

Luckily no persons were injured, however the crane sustained extensive damage to the tyres, lifting rope and electrical system on the crane.

C.1.1 Contributing factors and relevant parts

Failure to:

- maintain relevant approach distance to the power lines and take outcome of the possibility of the lifting chains swinging towards the overhead power lines when the crane was operated – parts 2 and 3;
- carry out an adequate risk assessment of the worksite – parts 2 and 4.2.2;
- implement appropriate risk treatment measures for the work – parts 2 and 4.2.3; and
- use a safety observer to observe the crane operations near the power lines – part 4.3.

C.2 Case 2: Setting up a mobile concrete pump

As the project manager, Kevin understands and manages his Workplace Health and Safety obligations but he also knows that power line safety is just as essential. For the type of projects he uses concrete pumps regularly. An important part of setting up concrete pumping equipment for a project is to consider the vicinity of overhead power lines in the risk management process.

- With his contractors Kevin makes certain that he has identified the exclusion zone minimum clearance distance for the concrete placement boom in consultation with the electricity entity and allowing for sway and sag of the lines. He documents this all in a risk assessment. Parts 2, 3 and 4.2.
- Kevin ensures the pump is able to be set up on solid ground to prevent inadvertent movement of booms into exclusion zones. Part 4.2.2.
- He makes certain that the safety observer watches while pump operators set up and that they keep the pipes away from exclusion zones and parallel to the ground where possible. Part 4.3.
- Ensures a safety observer is present to warn the operator when the placement boom approaches the exclusion zone. Part 4.3.

C.3 Case 3: Incident – scaffolding work

A worker died and three apprentice roof plumbers were injured when attempting to move an 8.9 metre high aluminium scaffold at a construction site. At the time of the incident the workers were moving the mobile scaffold over soft sand when the castor wheels located at the base of the scaffold sunk into the sand causing it to fall and make contact with 33,000 volt overhead power lines that were located adjacent to the construction site.

C.3.1 Contributing factors and relevant parts

Failure to:

- carry out an adequate risk assessment of the worksite to account of the ground conditions at the worksite – parts 2 and 5.3.2; and
- implement appropriate risk treatment measures for the work – parts 5.3.3 and 5.3.4.

C.4 Case 4: Incident – farm machinery

A farmer operating a harvester on his own property received a fatal electric shock when the raised delivery chute contacted 11,000 volt overhead power lines. The farmer was aware of the powerlines and had previously warned others to stay clear.

C.4.1 Contributing factors and relevant parts

Failure to:

- maintain relevant approach distance to the power lines – parts 2 and 3; and
- carry out an adequate risk assessment of the worksite and implement appropriate risk treatment measures to ensure exclusion zones are adhered to – parts 3 and 7.4.

C.5 Case 5: Incident – irrigation pipes on a rural property

While attempting to remove vermin from metal irrigation pipes, a farmer working in a field received a fatal electric shock when he raised an irrigation pipe, into 22,000 volt overhead lines above trying to shake out the vermin blocking the pipe. The power line height was correct.

C.5.1 Contributing factors and relevant parts

Failure to:

- identify the risk of raising objects into the overhead powerlines – part 7.3.1; and
- carry out a risk assessment of the worksite and implement appropriate risk treatment measures – parts 2 and 7.4.

C.6 Case 6: Rural workplace, cane haulage

Ray, a cane farmer, attended a safety conference run by his growers association and heard a presentation from the local electricity entity about power line safety. The presenter highlighted the need for cane haul out and harvesting contractors to manage the risks around overhead powerlines. Ray had previously attended a training program about safe working near exposed live parts which equipped him with the knowledge to manage the risk by introducing a number of risk treatment measures for crane haulage activities at their designated rail siding delivery point.

- Ray's risk assessment identified that power lines near the delivery point raised the possibility of cane haulers entering the exclusion zone when lifting their bins. Parts 2, 3 and 7.3.1.
- A designated bin lift and tip point (administrative risk treatment measure) was introduced via signage containing the instruction 'Bins not to be lifted before this point'. Part 7.3.
- Ray contacted the electricity entity who installed flag markers on the power lines crossing near the cane delivery point to make them more visible to operators. Parts 2 and 7.3.3.

C.7 Case 7: Incident – tip truck operation

A tip truck contacted an 11,000 volt overhead power line causing it to break and fall to the ground striking a worker who was at the worksite. At the time of the incident the tip truck was delivering a load of granulated bitumen to the worksite when the tip tray of the truck was raised upwards into the overhead power lines.

C.7.1 Contributing factors and relevant parts

Failure to:

- plan the work and identify the risk of the overhead power lines – parts 2 and 4.2;
- maintain the relevant approach distance to the overhead power lines and take account of the height of the raised tray when the load was dumped at the worksite – parts 3 and 4;
- carry out a risk assessment of the worksite – parts 2 and 4.2;
- implement appropriate risk treatment measures for the work – parts 4.2.3 and 4.2.4; and
- use a safety observer to observe the truck operations near the power lines – part 4.3.

C.8 Case 8: Safety Observer for a crane near power line

Kevin's Sign Company occasionally manufactures and installs tall advertising signs by the roadside near where overhead powerlines exist. Kevin is aware of the need to manage the risk of overhead powerlines and has had a consultant assist in preparing and documenting a risk management manual. In Kevin's workshop work is about to begin on the design and construction of a new sign for a shopping centre. The company's safe work procedures are applied at the beginning of each new job. Kevin needs to visit the site to check some dimensions and carry out a site risk assessment.

- As part of the company's documented safe work procedure, Kevin's site visit identified the risk of overhead powerlines.
- Kevin contacted the local distribution entity and received advice on the power lines to allow him to assess the exclusion zone distances and the need to use a safety observer.
- Kevin discusses his requirements with his crane contractor who has also visited the site. Kevin uses this operator because he has been given a copy of their safe work procedures and can check the qualifications of operators easily.
- On the day of the sign's installation, clear instructions are given to the crane driver and the safety observer.
- The dogger that assisted on the day is trained to know his responsibilities as he takes on the safety observer role, has radio communication with the operator and is in a position to clearly see the job and can stop it at any time.

C.9 Case 9: Incident - Working around electrical risks in buildings

A builder working near a switchboard was electrocuted when one of the nails he was using to fix panelling pierced the consumer's mains feeding the switchboard. The building's wiring was in accordance with the wiring rules.

C.9.1 Contributing factors and relevant parts

Failure to:

- Carry out a risk assessment of the job near the switchboard and implement appropriate risk treatment measures- – parts 2 and 10.2.

Appendix D: *The Electrical Safety Act 2002*

The Act imposes electrical safety obligations on persons for the electrical safety of themselves and others.

A person can have an electrical safety obligation in more than one capacity. For example, a corporation may have an obligation not only as a generation entity but also as an employer, supplier or person in control.

The following are sections of the Act which have been referenced in this Code. For detailed information, please see the appropriate section of the Act.

Part 2 Electrical safety obligations

Division 2 Electrical safety obligations

Section 29	Obligation of electricity entity
Section 30	Obligation of employer or self-employed person
Section 31	Obligation of designer of electrical equipment
Section 32	Obligation of manufacturer of electrical equipment
Section 33	Obligation of importer of electrical equipment
Section 34	Obligation of supplier of electrical equipment
Section 35	Additional obligation of designer, manufacturer, importer or supplier of electrical equipment
Section 36	Obligation of installer of electrical equipment or electrical installation
Section 37	Obligation of repairer of electrical equipment or electrical installation
Section 38	Obligation of person in control of electrical equipment
Section 39	Obligations of worker
Section 40	Obligations of other person

Appendix E: The Electrical Safety Regulation 2002

The Regulation ensures the electrical safety of licensed electrical workers, other workers, licensed electrical contractors, consumers and the general public. It does this by prescribing how obligations set down under the Act can be met.

The following are sections of the Regulation which have been referenced in this Code. For detailed information, please see the appropriate section of the Regulation.

Part 4 Working around electrical parts

Division 2 Requirements for working around electrical parts and underground electrical services

Section 62 Employer or self-employed person to ensure work is performed in accordance with requirements

Section 62A Principal contractor for construction workplace – excavating and underground electrical service

Section 62C Employer or self-employed person at construction workplace – excavating and underground electrical services

Section 62D Employer or self-employed person not at construction workplace – excavating and underground electrical services

Section 63 Work involving direct contact with electrical part

Section 64 Work within exclusion zone for electrical part

Division 3 Consultation with persons in control of electric lines

Section 64A Requirement to consult



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