

Electrical Safety Code Of Practice 2010 Risk Management

Electrical Safety Office Queensland

Contents

Part 1. Introduction	4
1.1 Application and scope of Code	4
1.2 Legislative framework.....	4
1.3 What is a code of practice?	5
1.4 What is this Code about?	5
1.5 Electrical safety obligations	6
1.6 Obligations of a person who conducts a business or undertaking (employer or self-employed person)	6
1.7 How can I meet my obligations?	7
Part 2 : Overview of Requirements	9
2.1 Legislative basis for the risk management process.....	9
2.2 What is risk management?.....	9
2.2.1 Why use this Code?	10
2.3 Defining the context	11
2.4 Risk management: The 5 step process	12
2.4.1 Who should conduct the risk management process?.....	14
2.4.2 Types of risk assessments	14
2.4.3 When to use the process	15
2.5 Consultation	17
2.5.1 Who should be involved in consultation?	18
2.5.2 Benefits of consultation.....	19
2.6 Record keeping.....	19
Part 3 : Electrical Risk Identification.....	21
3.1 Step 1: Identify risks	21
3.1.1 Introduction.....	21
3.1.2 What is electrical risk?	21
3.1.3 How to identify electrical risks.....	21
3.1.4 Categorising electrical risks.....	22
3.1.5 What if . . . ?	22
3.2 How to look for and identify electrical risks.....	23
3.2.1 Visual inspection and observation.....	23
3.2.2 Structured approach.....	23
3.2.3 Some other points to keep in mind	25

3.3	What to look for - examples of electrical risks	25
3.3.1	Workplace safety culture	26
3.4	When electrical risks are identified.....	26
3.5	Applied case study: Risk identification	27
Part 4 : Risk Assessment – except for Licensed Electrical Workers		
	Undertaking Live Electrical Work	29
4.1	Step 2: Assess the risks.....	29
4.1.1	What is risk?	29
4.2	Why assess the risks?.....	29
4.3	How to assess risks	30
4.3.1	Likelihood and consequences	30
4.3.2	Estimating likelihood and consequences.....	30
4.3.3	Risk rating	34
4.4	Applied case study – Risk assessment.....	36
Part 5: Risk Management for Licensed Electrical Workers Undertaking Live		
	Electrical Work	38
5.1	Introduction.....	38
5.2	Risk matrix for live work	42
5.3	Summary	48
Part 6 : Treat, Implement, Monitor and Review		49
6.1	Step 3: Decide on risk treatment measures.....	49
6.1.1	The risk treatment hierarchy.....	49
6.1.2	Consultation	50
6.1.3	Selecting the most appropriate risk treatment measures.....	50
6.2	Eliminate the risk.....	51
6.2.1	Safe design.....	51
6.2.2	Policies and procedures.....	51
6.3	Prevent or minimise exposure to the risk.....	52
6.3.1	When exposure to the risk cannot be minimised by other means	53
6.4	Step 4: Implement risk treatment measures.....	54
6.4.1	Implementation plans.....	54
6.4.2	Additional steps for implementation	55
6.5	Step 5: Monitor and review	57
6.5.1	Monitoring the effectiveness of risk treatment measures	57
6.5.2	Reviewing the risk management process.....	58
6.6	Applied case study – Treat, monitor and review	58

Appendix A: Forms for record keeping..... 61

- Form 1: Electrical risk identification61
- Form 2: Risk assessment and treatment 62
- Form 3: Risk identification 63
- Form 4: Risk assessment 64
- Form 5: Risk treatment measures 65
- Form 6: Risk treatment implementation plan..... 66
- Form 7: Review of risk treatment measures..... 67
- Form 8: Electrical risk register..... 68

Appendix B: Glossary of terms used in this Code..... 69

Appendix C: List of Electrical Safety Codes of Practice..... 74

Part 1. Introduction

1.1 Application and scope of Code

- *This Electrical Safety Code of Practice 2010 – Risk Management* (the Code) was made on 18 December 2009.
- This Code first commenced on 1 January 2010.
- This Code expires 10 years after it first commenced.

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 that employers, employees, workers, designers, manufacturers, importers and persons in control of electrical equipment 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* (the 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.

Where the WHS Act and the Act apply, the requirements of the Act take precedence.

The purpose of the *Electrical Safety Regulation 2002* (the Regulation) is to:

- ensure the electrical safety of licensed workers, other workers and licensed electrical contractors;
- enhance consumer protection in relations to electrical work; and
- ensure electrical equipment hired or sold is electrically safe.

The Regulation prescribes requirements for the performance of live work and codes of practice give practical advice on ways to manage the obligations set down in the Act and to meet the requirements of the Regulation.

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.

Note: There may be additional non-electrical risks in the workplace, which have not been specifically addressed in this Code. These risks should be assessed to ensure that risk treatment measures are implemented and reviewed to prevent or minimise exposure to these risks. Please refer to the relevant *Workplace Health and Safety Queensland Codes of Practice*.

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, a 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 recommends practical methods for managing electrical risks and defines and explains the five step risk management process to perform to make sure all electrical risks are minimised. This Code covers the five step risk management process for electrical work performed by licensed electrical workers, illustrated in Figure 1. It describes:

- identifying electrical risks present for electrical work;
- assessing or evaluating risks for electrical work;
- deciding on risk treatment measures; and
- implementing and monitoring risk treatment measures.

In practice, a documented risk assessment could form part of a work method statement for electrical work. Appendix A contains forms that can be used to record the risk management process detailed here.

Section 11 of the Regulation states that, subject to the circumstances described in section 12, live work must not be performed, and that each exposed part is to be treated as if it were energised until it is isolated and proven to not be energised. To work de-energised, you must first test to ascertain whether the electrical part is de-energised or not.

Part 5 of this Code relates to risk management specifically for licensed electrical workers undertaking live electrical work, and also describes and illustrates the risk / consequence matrix to be used by licensed electrical workers performing live electrical work.

Approved high voltage live line work, under a high voltage live line work management plan as prescribed under section 13 of the Regulation, is not covered by this Code. However, high voltage live line workers are subject to this Code for electrical work activities while not performing high voltage live line work.

1.5 Electrical safety obligations

Sections 29 to 40 of the Act place obligations on certain persons to ensure electrical safety. Electrical safety is ensured when a person or property is free from electrical risk. This means that the electrical risk¹ to the person or property is as low as reasonably achievable, having regard to likelihood of harm and likely severity of harm. Ensuring electrical safety involves identifying and managing exposure to risks at the workplace or electrical equipment at the workplace.

1.6 Obligations of a person who conducts a business or undertaking (employer or self-employed person)

The Act places obligations on a person who conducts a business or undertaking. The obligations apply whether or not the person:

- conducts the business or undertaking as an employer, self-employed person or otherwise; or
- works on a voluntary basis.

¹ 'Electrical risk' 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.

A person who conducts a business or undertaking has a general obligation to ensure the business or undertaking is conducted in a way that is electrically safe. Additional specific safety obligations apply to:

- electricity entities;
- employers or self-employed persons;
- manufacturers, importers and suppliers of electrical equipment;
- designers, installers and repairers of electrical equipment and electrical installations;
- persons in control of electrical equipment; and
- workers and other persons at a place where electrical equipment is located.

Where this Code provides advice to employers and self-employed persons on managing exposure to electrical risks, other persons who conduct a business or undertaking may also find this advice applicable, depending on their circumstances.

1.7 How can I meet my obligations?

There are three types of legislative instruments provided for in the Act that assist to meet electrical safety obligations: regulations, ministerial notices and codes of practice. If there is a regulation or ministerial notice that prescribes a way of preventing or minimising exposure to a risk, or prohibits exposure to a risk, a person must follow the prescribed way.

If there is a code of practice stating a way of managing exposure to a risk:

- (a) the stated way must be adopted and followed to manage the exposure to the risk; or
- (b) a person must adopt and follow another way, that gives the same level of protection against the risk, and take reasonable precautions and exercise proper diligence.

If there is no regulation, ministerial notice or code of practice about a risk, a person discharges the person's electrical safety obligation for exposure to the risk by doing both of the following:

- (a) adopting and following any way to discharge the person's electrical safety obligation for exposure to the risk; and
- (b) taking reasonable precautions, and exercising proper diligence, to ensure the obligation is discharged.

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 : Overview of Requirements

2.1 Legislative basis for the risk management process

The purpose of the Act is to establish a legislative framework for preventing:

- persons being killed or injured by electricity; and
- property being destroyed or damaged by electricity.

2.2 What is 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 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 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.

2.2.1 Why use this Code?

This Code provides advice on the general process of risk management for use in all industries where there may be electrical risks. The procedural steps to manage risks are:

1. Regulation or ministerial notice

If there is a regulation or ministerial notice that prescribes ways of controlling electrical risks, the regulation or ministerial notice must be followed.

2. Code of practice

If there is no regulation but there is a code of practice made about an electrical risk, then either the code must be followed or another way that gives the same or better level of protection against the risk must be adopted and followed whilst taking reasonable precautions and exercising proper diligence.

3. Guidance material

If there is no regulation, ministerial notice or code of practice made about an electrical risk, guidance material can be used as a resource in the risk management process.

4. Unspecified

For identified risks that do not fall into any of the above categories, the risks should be assessed using the risk management process. More details on the risk management process are given in other parts of the Code.

2.3 Defining the context

It is important to consider the context in which the risk management process takes place before the five steps are undertaken. Defining the context includes looking at all aspects of the activity being assessed. Are there interactions with other risks? One of the major difficulties in conducting effective risk management occurs when activities associated with the electrical risk are not clearly defined. Each activity can have many risks and many potential risk events.

Defining the context involves identifying:

- work processes, practices, activities and tasks that will be analysed in the electrical risk management process and the steps involved;
- the people involved in carrying out those work processes and in what capacity;
- whether the people involved are sufficiently competent/skilled/experienced; and
- what items of electrical or operating plant are used.

To define the context it is essential to ensure extensive consultation, which includes all workers doing the tasks, employers, safety officers and experts regarding electrical risks to be identified.

Consultation is the foundation of good risk management.

You have to do it, not just talk about it.

2.4 Risk management: The 5 step process

The five basic steps in the workplace health and safety risk management process set out below should be followed to manage exposure to electrical risks. The steps are illustrated below in Figure 1.

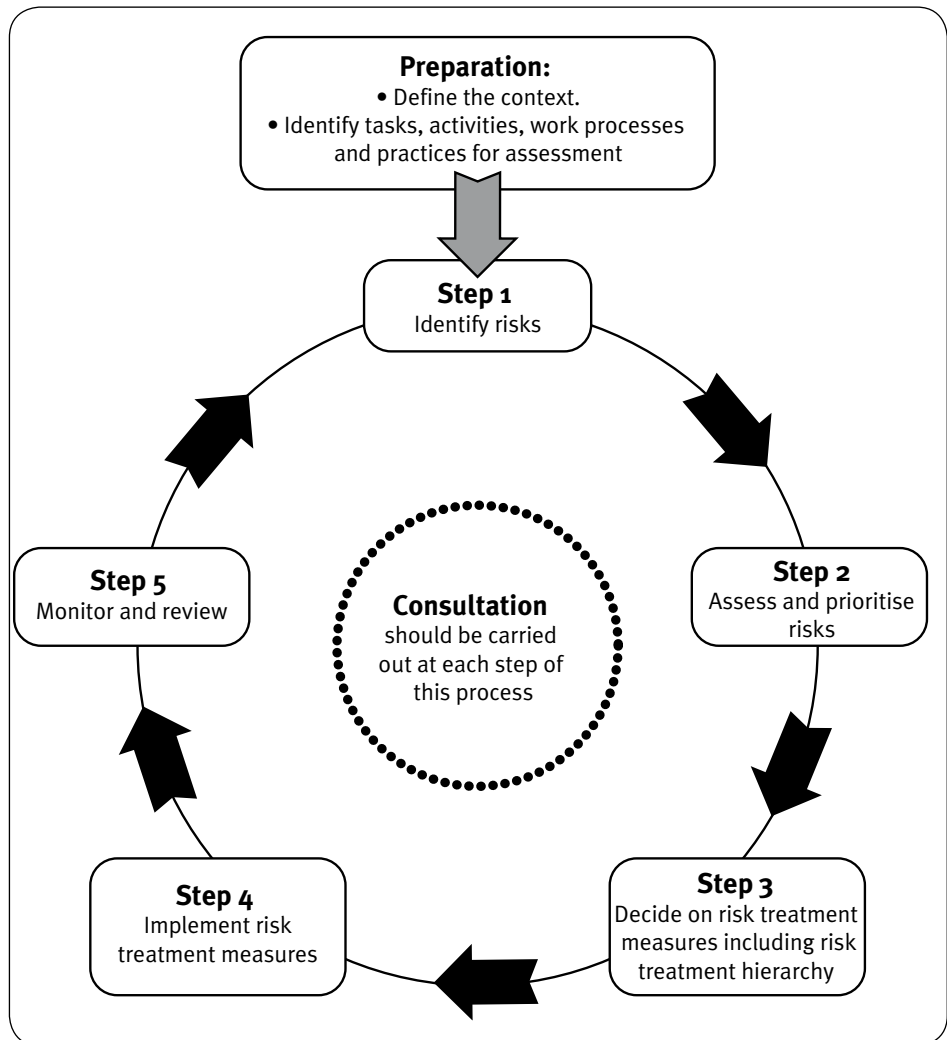


Figure 1: The five step risk management process

The five step risk management process is preceded by:

Preparation

- define the context (see Part 2.3 of this Code); and
- identify activity/task/work area/personnel to be assessed.

then:

Step 1: Identify all risks:

- observe, inspect, investigate, communicate and consult; and
- make a record of the risks identified.

Step 2: Assess the risks these risks create:

- assess and prioritise the risks;
- deal with the highest priority risks first; and
- deal with lesser risks or least significant risks last.

Step 3: Decide on measures to treat the risks:

- eliminate the risk;
- if elimination of the risk is not possible, select these treatment measures in the following order of preference:
 - (i) substitution;
 - (ii) isolation (not administrative);
 - (iii) minimisation by engineering means;
 - (iv) application of administrative measures; and
 - (v) use of personal protective equipment (PPE).

Step 4: Implement appropriate risk treatment measures to:

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

Step 5: Monitor the risk 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?

These five steps can be applied in all types of workplaces. In some cases it may be more effective to perform more than one step at a time. The way the risk management process is implemented can depend on the type of business activity and tasks involved at the workplace. For example, a small business may deal with its risks differently to a very large business.

2.4.1 Who should conduct the risk management process?

It is important for the person conducting the risk management process to remain as objective and practical as possible.

The person conducting the process should:

- consider what actually happens in the workplace;
- review existing assessments and any previous incidents;
- determine whether any existing risk treatment measures are adequate and make sure all relevant risks are addressed;
- consult with the workers who are involved, as the workers are the ones exposed to the risks and are in a better position to be able to identify all the risks;
- inform management (if the person is not management) who then decides on the risk treatment measures in consultation with the workers; and
- monitor and review the effectiveness of the implemented treatment measures and the entire risk management process.

The risk management process is the key to systematically managing safety in the workplace.

The risk management process enables the obligation holder to show that all the relevant factors have been considered and the steps needed to treat the risks have been taken. Accordingly, it is important to document each step of the process to show you have complied with the obligation.

2.4.2 Types of risk assessments

Risk assessments can be classified into three categories, however the first two types of risk assessment are appropriate for most workplaces:

1. *Strategic risk assessment* is conducted at the work planning stage and periodically.
2. *Operational risk assessment* is conducted immediately before the work starts.
3. *Specific requirements*: risk assessments of credible emergencies including first aid.

Strategic risk assessments are planned and systematic. The assessments are carried out throughout the work process, are comprehensive, and document the processes of interaction and control.

Operational assessments are simplified processes to check that risks and treatment measures are as expected. Such assessments also assist in task induction. A checklist can be used for this purpose. This style of risk assessment is important as many risks can be identified where they may have been missed in a strategic risk assessment.

Specific assessments may involve a review of credible emergency events. These can also be undertaken using the five step risk management process. For example, during Step 2, the risk event is the credible emergency that could occur.

2.4.3 When to use the process

Electrical safety risk management is an ongoing process and must be undertaken at various times including:

- NOW, if it has not been done before;
- when planning or making a change;
- after an incident (and/or a near miss);
- at regular or scheduled intervals appropriate to the nature of the workplace and the risks present;
- when legislative obligations change (including regulations); and
- before work starts.

Now

If the process has not been done before to make sure electrical safety is managed at the workplace, do so now.

Whenever planning or making a change

Risk management is more effective when undertaken during the planning phase (i.e. before work starts or at the design, development or tendering stage).

Whenever workplace changes are made to workers, work practices or the environment, including tools and equipment, the risk management process should be applied to manage any new risks.

Any changes made to equipment, work practices and other factors that can influence risks, should be discussed with the workers affected by the changes before they are made, in order to incorporate as much information in the decision-making process as possible.

Some examples of planned or actual changes that may occur at workplaces at various times are:

- starting a new project;
- changes in work procedures and/or practices;
- changes to the worksite during construction phases;
- changes in work schedules (e.g. introducing extended work hours or shift work);
- changes in how materials and substances are used, who uses them and how much is used;
- changes in the use or location of tools, equipment or machinery;
- discovery of new information about a previously unknown design or manufacturing fault, or about a previously unidentified risk;
- introducing new workers with different skill levels or workers returning after periods away from the task;
- changes in a control measure after reviewing the effectiveness; and
- plans to design a new facility or premises including the layout of the work area and fit-out.

After an incident

If an incident (or a near miss) occurs, the electrical safety risk management process must be reviewed to determine whether changes to the particular task are needed and if alternative or additional controls need to be introduced. Any changes should be discussed with all workers performing the task.

At regular or scheduled intervals

The risk management process should be repeated regularly or at scheduled

intervals appropriate to the workplace². The period between repeating the process will depend on the nature of the risks and the degree of change likely in the work activity. Generally, the risk management process should be undertaken more often if there is:

- a high level of risk involved with the work activity;
- a higher likelihood that an incident or injury will occur; and
- the potential for more serious consequences such as death or permanent disability from an incident.

Both regular and scheduled intervals should be clearly identified, defined and approved by management. They should be recorded in a schedule or register that is regularly reviewed and monitored. This register should define resources (time/ money) and responsibilities to ensure the process occurs. A sample register can be viewed in Part 4 of this Code.

When legislative obligations change

When changes are made to workplace health and safety, electrical safety, or any other legislation that might affect the work operations or environment, all existing risks should be reviewed.

Before work starts

Checks to identify faults, misplaced items or other risks to staff should be done before any work activity starts. Checklists can be used to assess the risks.

2.5 Consultation

Consultation fosters cooperation and develops partnerships between government, employers and workers to ensure workplace health and safety and electrical safety. Consultation means to inform and to seek advice or information from the people involved with the workplace, work and industry.

Consultation should take place at every stage of the risk management process including when:

- new work processes, equipment or tools are being designed, purchased or modified (consult early to allow changes to be incorporated);
- identifying problem jobs which require assessment;
- establishing priorities for the assessment of problem jobs and during the risk assessment process;

² Under the *Workplace Health and Safety Act 1995* section 96(7)(b), a workplace with a Workplace Health and Safety Officer (WHSO) is required to assess hazards and risks at least once every 12 months.

- deciding on risk treatment measures to manage exposure to electrical risk factors;
- reviewing the effectiveness of implemented treatment measures and identifying whether further risks of injury have been created by the chosen measures; and
- deciding the contents of procedural documents, as experienced workers can help make sure they are as relevant as possible to the actual work situation.

2.5.1 Who should be involved in consultation?

The WHS Act provides for formal consultation through workplace health and safety representatives (WHSRs), workplace health and safety officers (WHSOs), and workplace health and safety (WHS) committees where these are required or are active in the workplace.

The WHS Act:

- provides for the election by workers of one WHSR, who must be a worker;
- provides for the election by workers of more than one WHSR (who must be workers), with agreement between the employer and workers, where each WHSR then represents a particular part of the workplace; and
- covers the establishment, composition and proceedings of WHS committees.

For details on the legislative requirements for formal consultation, refer to the Department of Justice and Attorney-General website at www.worksafe.qld.gov.au.

A comprehensive consultation process will also help to achieve better electrical safety outcomes through the risk management process. The consultative group could include:

- electrical workers;
- supervisors;
- WHSRs;
- WHSOs;
- WHS committees;
- electrical contractors;
- electrical suppliers;
- additional external bodies such as other organisations using similar processes or activities; and
- specialist groups such as electrical engineers.

2.5.2 Benefits of consultation

Consultation between management and workers is beneficial throughout the risk management process because it:

- brings together different areas of expertise to identify and analyse risks and allows those with day to day experience of the risks to provide valuable input;
- allows workers to have ownership of the risks and the solutions;
- increases the likelihood that workers will be committed to implementing the risk treatment measures because they understand why they are being imposed;
- increases workers' morale, satisfaction and retention rates, as staff feel they are being listened to and involved;
- improves trust, communication and teamwork;
- improves productivity as a result of better decision-making processes; and
- contributes to developing a positive electrical safety culture in the workplace, by increasing team commitment to electrical safety.

2.6 Record keeping

Keeping good records of the risk management process demonstrates potential compliance with the Act with respect to treating risks in the workplace. It also maximises the effectiveness of the process and assists when undertaking subsequent risk assessments (the forms in Appendix A may be of assistance).

Some of the reasons for keeping records about the electrical risk management process and electrical safety activities are to:

- demonstrate that the process was conducted properly (e.g. to provide evidence);
- provide a record of risks;
- provide the relevant decision makers with a risk management plan for approval and subsequent implementation;
- provide a responsible and accountable mechanism and tool;
- measure progress and change through continuous monitoring and reviewing;
- provide an audit trail;
- comply with legislative requirements; and
- share and communicate information.

The records should show that the process has been conducted properly and include information about electrical risks at the workplace as well as the risk treatment measures. The detail and extent of recording will depend on the size of the workplace and the potential for major electrical safety issues. Adequate records will substantiate what the chosen risk treatment measures were based upon and the basis upon which the risk assessment was undertaken.

The information to be recorded includes:

- the risk assessment date, identified electrical risks, assessed risks and chosen risk treatment measures;
- how the risk treatment measures were implemented, monitored and reviewed;
- relevant related training records; and
- the consultation undertaken and who was involved.

The records of information could also include the:

- checklists, worksheets and any assessment tools used in working through the risk management process;
- names of the WHSO, WHSR and WHS committee members;
- plans for changes; and
- plans for the development and implementation of risk treatment measures.

Everyone in the workplace should be aware of record keeping requirements, including which records are accessible and where they are kept.

It is a requirement under section 57AB of the Act that an employer or self-employed person must keep a register of licensed electrical workers.

Part 3 : Electrical Risk Identification

3.1 Step 1: Identify risks

3.1.1 Introduction

Workplaces contain a range of risks. This aim of this part is to give practical advice about how to identify **electrical risks** at a workplace for the purpose of managing exposure to risks at the workplace.

3.1.2 What is electrical risk?

Electrical risk 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.

This is the definition of 'electrical risk' for the purpose of this Code.

3.1.3 How to identify electrical risks

The first step in the risk management process is to identify electrical risks. This means looking for those things associated with electricity at the workplace that have the potential to cause harm.

To begin identifying electrical risks, ask the questions:

- Where are electrical installations located in this workplace?
- Are there any electrical risks from the installations or associated work practices?

These are proactive ways to identify risks. Electrical risks can also be identified from records of past accidents and near misses.

3.1.4 Categorising electrical risks

Electrical risks are not always obvious and may be overlooked by even experienced electrical workers. For example, electrical wiring may be inside walls and not obvious or evident.

To assist in identifying risks, they may be categorised as follows:

- **The obvious risk** is apparent to the senses (e.g. visibly damaged electrical equipment).
- **The concealed risk** is not apparent to the senses (e.g. electricity supply infrastructure inside walls).
- **The developing risk** cannot be recognised immediately and will develop over time (e.g. fraying electrical extension cords due to surface contact).
- **The transient risk** is an intermittent or a temporary risk (e.g. use of lifting equipment near overhead lines or intermittent electrical defect).

It is important to remember that an electrical risk may become more obvious and easily identifiable when a person actually performs a task.

To make the job of identifying electrical risks in the workplace easier, prepare and establish the context for the risk management process. This involves identifying:

- all activities involved in work processes and tasks;
- who is involved in those activities; and
- items of plant or materials that are used.

Then make a list of all the electrical risks at the workplace. Once this list of electrical risks is compiled, each risk should be considered individually. Example forms to help with this process are attached in Appendix A.

3.1.5 What if ...?

Having a structured approach to identifying electrical risks improves the chances of identifying all of the risks in the workplace. A person can ask themselves:

- Is this activity safe?
- What if this or that occurs - then - what will happen?

When identifying a risk a person should ask:

- Is it possible that ...?
- What would happen if ...?

This is the 'What if ...?' approach to what could happen.

Ask 'What if ...?' rather than think 'that could not happen!'

3.2 How to look for and identify electrical risks

3.2.1 Visual inspection and observation

The most common and simple way to begin to look for electrical risks is to conduct regular walk- through visual inspections of the workplace. Look at each task the workers do to see if any electrical risks are present, such as the use of electrical equipment to handle loads or proximity to electrical installations.

It may also be helpful to observe task performance and the activities involved, such as set-up, operation, cleaning, maintenance and inspection, as more electrical risks may become apparent. This will provide the opportunity to see whether the documented procedure for performing the task is being followed by the workers, or whether workers are taking short cuts or speeding up work, thus creating a risk.

3.2.2 Structured approach

To improve the chances of identifying all of the electrical risks in the workplace, it will help to take an additional structured approach.

One way is to divide the workplace into groupings such as:

- locations, such as offices, grounds, warehouse or wet areas;
- functions or production processes, such as administration, cooking, washing, cleaning, receiving, forming, or finishing;
- roles, such as electrical workers and non-electrical workers; and
- tasks such as working with electrical equipment, operating plant near overhead electric lines or clearing vegetation near overhead lines.

Another way to identify electrical risks in the workplace is to make a list itemising equipment, tools and known processes. From this list, determine whether there are any existing regulations or other codes of practice that apply which specify restrictions or risk treatment measures. The list will also provide a useful checklist to work from.

Other ways to help identify electrical risks include:

- consulting workers about:
 - problems they have encountered in doing their work;
 - any modifications to their work processes;
 - any serious electrical incidents, dangerous electrical events, near misses³, or events that have not been reported;
 - unreported minor injuries;
 - any unreliable or malfunctioning electrical equipment; and
 - review of renovations, repairs or expansions to buildings or structures for electrical risks.
- conducting an electrical safety audit
- seeking information by:
 - consulting with Workplace Health and Safety Representatives (WHSRs) and workplace health and safety committees;
 - knowing the industry's experience of common potential electrical risks; and
 - acquiring information from designers, manufacturers, suppliers, and other organisations, such as unions, employer bodies and health and safety consultancies.
- analysing:
 - records and data covering incidents and near misses, worker complaints, sick leave and staff turnover; and
 - maintenance records, results of surveys, audits or inspections.

³ Near misses should be investigated immediately after they occur to ascertain their cause. Also, workers should be encouraged to report all injury incidents, even those resulting in very minor injuries.

3.2.3 Some other points to keep in mind

When collecting information to identify electrical risks, consider the following:

- competency and level of training of workers and whether it is adequate;
- how people actually use, clean, service or repair electrical equipment; and
- how suitable the things used for the task are, and how well they are located.

Think:

'Although nothing has happened in the past, it may still be unsafe.'

3.3 What to look for - examples of electrical risks

Look at each task the workers do to determine whether any electrical risks are present.

The common electrical risks and causes of injury can be broken into three broad categories⁴. They are:

- **Electric shock** causing injury or death. The electric shock may be received by direct contact, tracking through or across a medium, or by arcing.
- **Arcing, explosion, overheating or fire** causing burns. The injuries are often suffered because arcing, explosion, or both occur when high fault currents are present. Overheating can also result in burns and fire.
- **Toxic gases** causing illness or death. Burning and arcing associated with electrical equipment causes a range of toxic gases and contaminants to be present. Compounds ranging from ozone to cyanide and sulphuric acids can be present as well as the risks such as low oxygen content in the air.

These common electrical risks may be present individually or combined.

Some workplace activities or arrangements may create or increase risks, if they are not properly managed. These include:

- purchasing policies (e.g. ensure that all purchases of electrical equipment include the necessary documentation to prove they are electrically safe and that it is electrically suitable, and ensure that all electrical work done is carried out by licensed contractors);
- roles, responsibilities, and accountabilities (e.g. if they are not clearly defined, people will not know what they have to do, when or how to do it);

⁴ AS/NZS 4836.2001 – Safe working on low-voltage electrical installations, section 2.3 and Electrical Safety Code of Practice for Electrical Work (Part 2)

- maintenance and servicing programs for plant to cover wear and tear to electrical components are to be carried out in accordance with manufacturers' recommendations by appropriately licensed electrical workers; and
- training programs, where risk management of property is emphasised over the risk management of people and safety.

3.3.1 Workplace safety culture

From a very broad perspective, the organisational environment and culture in the workplace, and how it contributes to risks, may form a framework for risk identification.

Workplaces have a strong safety culture where:

- management promotes risk awareness and mindfulness;
- electrical safety comes first in the minds of the workers, who will be less likely to cut corners or engage in unsafe behaviour; and
- management encourages workers to speak up when they identify electrical risks in the workplace.

Workplaces **do not** have a strong safety culture where:

- workers are encouraged to work outside their training or accreditation area to achieve targets;
- management allows workers to cut corners; or
- skylarking, pranks or other practical jokes that increase the likelihood of an accident, are tolerated by supervisors or managers.

In these workplaces, the worker's way of thinking is in itself a risk; it has the potential to cause them or others harm.

3.4 When electrical risks are identified

Once the electrical risks in the workplace have been identified, it is good practice in a risk management system to enter them into a risk register (see Appendix A). A register of all electrical risks in a workplace is an important reference tool, as it can assist in identifying 'new' electrical risks in other tasks in the workplace, and provides a record of actions taken to treat the electrical risks. The best results in electrical risk identification are obtained when the workers are consulted in the process.

Actions for Step 1: Identify electrical risks

1. Copy an electrical risk identification form (Form 1) from Appendix A of this Code.
2. Complete the electrical risk identification section on the form.
3. Transfer the description of the electrical risk and the perceived associated risk to the risk register - Form 8 from Appendix A of this Code.

3.5 Applied case study: Risk identification

The following case study is an example of how to use the Code.

Information to set the context

The workplace is a bakery that also provides coffee and toast, snacks etc. It is one of several recently taken over by the same employer. The business is large enough to include a WHSO (Charles Blogg) among the staff members. Charles has been working with the company for 12 months, and has been asked to undertake an electrical safety risk management process.

Charles discussed the electrical safety review with his employer and they agreed on how it would be done. Charles made it clear that, although he was an experienced WHSO for bakeries, he would rely on licensed electrical workers to assist in the risk management process. They agreed that the bakery's regular electrical contractor should be involved as well as the manufacturers, suppliers and maintainers of the bakery's electrical equipment.

In preparation for this review, he divided the workplace into three sections (bakery, coffee shop and public areas). Starting with the bakery, Charles identified the different activities and tasks that are carried out by the workers.

These include:

- preparing a number of different products such as breads, cakes, slices and doughnuts; and
- cleaning up using water and detergents.

In the coffee shop area, Charles identified activities associated with the preparation of coffee, toast and other snacks. These included:

- preparing coffee;
- toasting and buttering a range of breads; and
- taking payment from customers.

Charles also conducted an inspection of the public area.

The staff who carry out these tasks are: Tim, the head baker who has 25 years experience; Tina, the baker's assistant (one year out of her apprenticeship); and John, a young apprentice (first year and not yet at apprenticeship college). Charles has met with all workers to advise he is going to be reviewing the electrical safety of their workplace and has asked them to think about things they think are unsafe or dangerous.

The forms used throughout this case study are included in Appendix A.

Case study

A walk-through survey of the bakery and consultation with the workers has identified the following electrical risks. This form can be found in Appendix A.

Example: Electrical risk register XYZ Retail Pty Ltd

Workplace area or grouping: <i>Bakery XYZ Retail Pty Ltd</i>		Ref. no: 1/08	
Form completed by: <i>C. Bloggs</i> (print name)		(sign)	
Date form completed: 26 / 11 / 08			
Ref. no.	Identified electrical risks	Date	Initials
1	Plug in electrical equipment toaster - shock risk.	25/10/08	CB
2	Lamp replacement and cleaning by staff - shock risk.	09/11/08 reported by Tina	CB
3	Overhead electric line to front of shop public area (outside) - shock risk if contacted by delivery trucks or other activities.	10/11/08	CB
4	Cleaning work in bakery may expose electrical equipment to water damage – shock risk.	15/11/08	CB

Charles realises that this list is incomplete and that additional information should be included after he has consulted with the licensed electrical workers who know the bakery and the types of electrical equipment used there, and can identify other electrical risks. Charles, in consultation with relevant licensed electrical workers, will revise and add to this register over time e.g. as the new owner upgrades electrical equipment or changes work processes.

Note: This list is not exhaustive and should not be used as a template for identifying electrical risks.

Part 4 : Risk Assessment – except for Licensed Electrical Workers Undertaking Live Electrical Work

4.1 Step 2: Assess the risks

4.1.1 What is risk?

**Risk is the likelihood and consequence of injury or harm occurring.
This is the definition of risk for the purpose of this Code.**

The degree of risk will depend upon the amount of exposure to the electrical risk. For example, electricity is hazardous: it has the potential to harm our health. But the level of risk depends on things such as:

- how much electrical equipment is present;
- the degree to which people interact with electrical equipment; and
- how much of the electrical equipment is used regularly.

4.2 Why assess the risks?

The purpose of a risk assessment is to determine:

- whether there is any likelihood of a potentially hazardous situation causing death, injury or illness to people in the workplace;
- how severe that risk is; and
- whether the risk needs to be treated and how urgently.

Assessing or evaluating the identified risks with the tools provided in this part will help to:

- determine which ones are the most serious (i.e. those with greater likelihood and most severe consequences); and
- plan the actions needed to treat the risks in order of priority, from most serious to least serious risks to health and safety.

Prioritising risks in this way is similar to triage in a hospital's emergency department. Both are systems of ranking in order of importance and allocating limited resources to treat the most serious first.

This Code does not cover all electrical risks in a workplace. Where there is no regulation or code of practice, or there are gaps that are not covered, a risk assessment should be undertaken to determine suitable risk treatment measures to cover the deficiency.

4.3 How to assess risks

4.3.1 Likelihood and consequences

To assess the level of risk, the likelihood of an event occurring (will it happen or could it happen?) and the extent of the consequences that could result (if it does occur, how serious will the outcome be?) must be considered. Both factors are equally important in establishing the level of risk and it is not important which factor is considered first.

Risk = severity of consequences x likelihood of occurrence

4.3.2 Estimating likelihood and consequences

When estimating the likelihood of an event or situation occurring and the severity of the potential consequences, it is important for the person doing the risk assessment to refer to the following information:

- relevant training, particularly of licensed electrical workers;
- past safety records, such as safety committee information;
- incident statistics in the workplace or the whole industry;
- practice and relevant experience in the relevant organisation and others in the industry;
- manufacturer's data or information on proper use of electrical equipment;
- relevant published literature such as trade magazines, research articles, safety organisations and employer and employee organisations' materials;
- market research such as industry development of new materials and equipment;
- the results of public consultation such as new public projects or institute information;
- economic, engineering or other models such as Quality Assurance (QA), Total Quality Management (TQM) or safety culture;
- specialist and expert judgements such as safety consultants or case law decisions; and
- other codes of practice (e.g. *Working Near Exposed Live Parts or Electrical Work*).

Establishing likelihood

The likelihood of an event or situation occurring will depend on both the probability and frequency of exposure to a risk. There may be a number of factors specific to the workplace that will influence the likelihood of an event occurring, such as:

- how, where and when people are exposed to the risk; and
- how exposure varies over time or by location.

To help establish the best estimate of likelihood, there are a number of examples of factors listed below that may need to be taken into account.

Factors influencing likelihood

The following factors can affect the likelihood of an event or situation occurring:

- **How often the task occurs:** When the same tasks are repeated, the likelihood increases. For example, loading and unloading equipment such as extension cords from a ute may lead to dangerous abrasion of the insulation on the cords.
- **How many people are exposed:** Generally, the greater the number of people exposed to the risk, the more likely an incident will occur. For example, three shifts of workers in a 24-hour distribution centre, operating electrically powered conveyer belts could be exposed to an electrical risk if it was present.
- **The duration of exposure:** Generally, the longer a person is exposed to the risk, the more likely an incident will occur.
- **The position of the electrical risk relative to workers and to other risks:** For example, an electrician working in the vicinity of exposed live parts.
- **The skills and competence of persons exposed:** Workers who are not trained in safe and efficient methods of work are more likely to be injured. For example, if a worker has not been properly trained in using an item of electrical equipment, or a worker has not been trained in the safe operation of electrically operated plant, this could increase the chance of human error leading to dangerous events and injury.
- **Experience of persons exposed:** For example, a worker with 20 years experience is less likely to make the same mistake and cause an incident than a worker with only two months experience. Adequate training and reasonable competence to do a task will reduce the likelihood of an incident.

- **Distractions:** It is more likely that an incident will occur when a worker is not paying full attention to the task or their surroundings. For example, a worker listening to music through headphones increases the chance of being careless with an item of electrical equipment.
- **Environmental conditions:** For example, water in the vicinity of electrical equipment.
- **Condition of equipment:** The use of defective equipment is more likely to cause an incident. For example, a power cord may become worn or damaged through misuse.
- **The effectiveness of existing risk treatment measures:**
 - Do the existing risk treatment measures represent good practice?
 - Are the existing risk treatment measures preventing or minimising exposure to the electrical risk?
 - Do workers know about the existing risk treatment measures?
 - Are the existing risk treatment measures being used or followed?
 - Are there adequate systems or procedures in place in relation to the existing risk treatment measures?
 - Is there adequate training and supervision in relation to the existing risk treatment measures?
 - Is there adequate maintenance in relation to the existing risk treatment measures?
 - Are the existing risk treatment measures easy to use and follow?

The following descriptive scale can be used to nominate the likelihood of an event or situation occurring at the workplace.

Likelihood	Almost certain Likely Possible Unlikely Rare	expected in most circumstances will probably occur in most circumstances might occur at some time could occur at some time may occur only in exceptional circumstances
-------------------	--	--

Establishing consequences

The severity or range of the potential consequences resulting from an event or situation can be determined by a number of factors, such as:

- how much harm the risk could cause;
- how many people it could affect; and

- whether the harm would be short or long term.

Some examples of factors that can affect the severity of consequences resulting from an incident are provided below.

Factors influencing consequences

The following factors can affect the severity of consequences when an event or situation happens:

- **Potential for ‘chain reaction’:** Where a risk, if not eliminated, may evolve and compound into an even more dangerous situation. For example, there is the potential for multiple deaths when fellow workers attempt to assist and rescue a person suffering from electric shock.
- **Volumes of materials:** For example, the potential consequences of a leak of a small amount of water into the workplace not in an area where items of electrical equipment are being used may be relatively minor, compared with the potential consequences of the release of a large amount of the water. Electricity plus water is an increased risk.
- **Position of the worker relative to the risk:** For example, workers working close to electrical equipment are more likely to come into contact with faulty equipment than those working further away.
- **Forces and energy levels:** For example, the higher the voltage of electricity and the possibility of a high current flowing through a person, the more severe the consequences are likely to be.

The following descriptive scale can be used to nominate the consequences of an event or situation occurring at the workplace.

Consequences	Catastrophic	death
	Major	extensive injuries, loss of production
	Moderate	medical treatment
	Minor	first aid treatment only
	Insignificant	no injuries

Considering the consequences of an event or situation, there may be a fine line between an insignificant and a catastrophic outcome. In some situations, a near miss that results in no injury could just as easily have been fatal.

4.3.3 Risk rating

The level of risk, represented by a 'risk score' (number) and 'risk statement' (letter), is determined by the relationship between likelihood and consequence.

To determine the level of risk:

- plot the estimated levels of likelihood and consequence on the following risk priority chart to find the risk score and statement; then
- refer to the risk score and statement chart to see what actions need to be taken.

In the event of a licensed electrical worker performing live electrical work, they should use the risk / consequence matrix in Part 5 of this Code.

Risk priority chart (risk score and statement) – except for performing live electrical work (refer to Part 5 of this Code)

LIKELIHOOD How likely is it to happen?	CONSEQUENCES: How severely it hurts someone (if it happens)?				
	Insignificant (no injuries)	Minor (first aid treatment only)	Moderate (medical treatment)	Major (extensive injuries, loss of production)	Catastrophic (death)
Almost certain - expected in most circumstances	3 H	3 H	4 A	4 A	4 A
Likely - will probably occur in most circumstances	2 M	3 H	3 H	4 A	4 A
Possible - might occur at some time	1 L	2 M	3 H	4 A	4 A
Unlikely - could occur at some time	1 L	1 L	2 M	3 H	4 A
Rare - may occur, only in exceptional circumstances	1 L	1 L	2 M	3 H	3 H

Risk score and statement

Score and statement	Action
4 A: Acute	ACT NOW – Urgent - do something about the risks immediately. Requires immediate attention.
3 H: High	Highest management decision is required urgently.
2 M: Moderate	Follow management instructions.
1 L: Low	OK for now. Record and review if any equipment/ people/ materials/ work processes or procedures change.

It is important to note that these risk scores have no absolute value and should only be used for comparison.

This stage of the risk assessment provides the basis for ranking or prioritising risks in order of importance from 1 to 4 (4 being the highest risk score and the most important). When the risk scores for all the risks in the workplace have been compared, the resulting ranking will be a guide to the order in which these risks should be addressed. When more than one risk has the same ranking and not all can be dealt with at once, the risks may need to be reassessed to determine which is the most important to deal with first.

To get the best results from a risk assessment, consult with as many people as possible in the workplace including the WHS committee, WHSRs, WHSOs, supervisors, managers and others with knowledge and experience.

Simplified advice
<p>No or low risk - continue activity If it is not at all likely that anyone will be exposed to a hazardous situation or event, then there is no risk, and no risk control measures are required.</p>
<p>Moderate or high risk – continue activity under management instruction. If it is possible or likely that a person will be exposed to a hazardous situation or event, then risk control measures are urgently required.</p>
<p>Acute risk – stop activity now If there is an acute or immediate risk to health or safety, the process / activity in question must be ceased until measures are taken to remove the acute or immediate risk.</p>

4.4 Applied case study – Risk assessment

From the electrical risk register, risks are now assessed to determine their severity. This example uses the form 'Risk assessment and control' (Form 2) from Appendix A, and focuses on one of the electrical risks identified in the example in Part 3 of this Code. A separate form should be used for each risk.

Example: Risk assessment and control

Fill in one form for each risk identified at the workplace.

Workplace area or grouping: Bakery XYZ Retail Pty Ltd Ref. no:1/08
 Form completed by: C. Bloggs (print name) (sign)
 Date form completed: 26 / 11 / 08

Risk identification

Risk: *Plug-in electrical equipment toaster – shock risk.*
 Associated risk: *Person using toaster could receive a shock if toaster has been splashed with water.*
 Specific circumstances relating to the risk: *Toaster is located adjacent to hand washing facilities. It is a hygiene requirement that staff are required to wash hands before and after using any equipment.*
 Persons at risk: *All workers who use the toaster.*

Risk assessment

Existing risk treatment measures (if any):

Likelihood: (tick)	Almost certain	<input checked="" type="checkbox"/>	Likely	<input type="checkbox"/>	Moderate	<input type="checkbox"/>	Unlikely	<input type="checkbox"/>	Rare	<input type="checkbox"/>
Consequences: (tick)	Catastrophic	<input checked="" type="checkbox"/>	Major	<input type="checkbox"/>	Moderate	<input type="checkbox"/>	Minor	<input type="checkbox"/>	Insignificant	<input type="checkbox"/>
Risk rating:	Acute	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Risk control

This risk must be treated immediately. The toaster must not be used again until the risk has been eliminated.

Possible risk treatment options:

- Elimination:
- Substitution:
- Isolation or Engineering:
- Administrative or personal protective equipment:
- Preferred risk treatment options (and why):

Implementation plan

Treatment option	Associated activities	Resources required	Person(s) responsible	Proposed implementation date	Sign off and date	Scheduled review date

Review

- Are risk treatment measures in place?
 - Yes.
 - No, comment (why not?):
- Are risk treatment measures preventing or minimising the risk?
 - Yes.
 - No, comment (why not?):
- Are there any new problems with the risk?
 - No.
 - Yes, comment (what are they?):

Part 5 : Risk Management for Licensed Electrical Workers Undertaking Live Electrical Work

5.1 Introduction

This part covers all live electrical work that is made up of testing and other work, and also includes working near live electrical parts. It gives practical ways of managing the electrical risks associated with live electrical work performed by licensed electrical workers. It applies a five step risk management process that obligation holders under the Act should follow to make sure all electrical risks for electrical work are as low as reasonably achievable.

Effective risk management involves identifying all workplace risks, then carrying out a risk assessment for each risk to assess the severity of a risk before deciding its priority. When performing 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.

The five basic steps in the workplace health and safety risk management process should be followed to manage exposure to electrical risks. These steps are:

1. identify risks, based on experience, recorded data and other information;
2. assess the associated 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. select risk treatment measures from the risk treatment hierarchy (e.g. eliminate, substitute, isolate or engineer out the risks, or reduce them through administrative measures or personal protective equipment) by selecting the highest order treatment method possible and then proceeding down the list in order;
4. implement or apply the selected risk treatment measure(s) in the workplace; and
5. monitor the risk treatment measures to ensure that they are working correctly to control the risks and that no other risks have been introduced.

Detailed information about this process can be found in Part 2 of this Code.

This section provides practical advice to employers, self-employed persons and licensed electrical workers about how to identify electrical risks. Training

and experience enables licensed electrical workers to identify risks and carry out an effective risk assessment that will provide the measures to eliminate or significantly reduce the risk of a serious electrical incident or dangerous electrical event occurring. Further information on identifying risks and conducting risk assessments can be found in Parts 3 and 4 of this Code.

In live electrical work being performed by a licensed electrical worker, there may be a fine line between an insignificant and a catastrophic outcome if a serious electrical incident or dangerous electrical event occurs. Given the seriousness of electricity as a risk for licensed electrical workers working live, in the absence of any risk treatment measures, the matrix rating for consequences would chiefly be in the high zone.

Section 11 of the Regulation states that, subject to the circumstances described in section 12, live work must not be performed, and that each exposed live part is to be treated as if it were energised until it is isolated and proven to be not energised. To work de-energised, the licensed electrical worker must first test to ascertain whether the electrical part is de-energised or not. Testing is considered to be 'live work'.

While it is required to work live to test before an electrical part can be de-energised, this part is written on the understanding that, from time to time, licensed electrical workers will be required to carry out live electrical work. This can only be done after the actions described in section 12 of the Regulation have been carried out.

Section 12 Requirements for performance of live work⁵

- (1) The following circumstances are required for the performance of live work --
 - (a) it is not practicable to perform the electrical work other than by live work because of 1 or more of the following –
 - (i) it is necessary in the interests of safety, whether or not electrical safety, for the work to be performed while the electrical equipment the subject of the electrical work is energised:
Example for subparagraph (i) –
It may be necessary in the interests of road safety for a set of traffic lights to remain operating while electrical work is performed on the lights.

⁵ *Electrical Safety Regulation 2002*, section 12, Requirements for performance of live work.

- (ii) a supply of electricity is necessary for the proper performance of the electrical work;
- (iii) there is no reasonable alternative to performing the electrical work by live work;
 - Example for subparagraph (iii) –*
 - It may be necessary, to avoid widespread outages, to perform electrical work on works of an electricity entity by live work.
- (b) the employer or self-employed person has prepared, in a document, a risk assessment of the performance of the live work;
- (c) the performance of the electrical work is in accordance with a safe system of work;
 - Example –*
 - A safe system could include preventing persons from accessing the area where live work is being performed if the persons are not needed for the performance of the work.
- (d) the employer or self-employed person authorises the performance of the live work only after consultation with the person in control of the electrical equipment the subject of the electrical work;
- (e) the person who performs the live work has appropriate training for the performance of the live work;
- (f) testing equipment appropriate to the performance of the live work has been given to the person performing the electrical work, the testing equipment has been properly maintained, and the person performing the electrical work makes proper use of the testing equipment in performing the work;
- (g) clothing and personal protective equipment appropriate to the performance of the live work has been given to the person performing the electrical work and the person performing the electrical work makes proper use of the clothing and equipment in performing the work;
- (h) other than for exempt electrical work, the isolation point of the electricity supply for the electrical equipment the subject of the electrical work –
 - (i) has been clearly identified; and
 - (ii) is able to be reached quickly without the need to climb over or shift obstructions;
- (i) the area where the electrical work is performed is clear of obstructions to the extent necessary for easy access to and from the area;

- (j) there is a safety observer observing the performance of the electrical work unless –
 - (i) the work involves testing electrical equipment; and
 - (ii) the risk assessment prepared under paragraph (b) does not show there is a high risk to electrical safety in performing the testing of the electrical equipment.

Example for subparagraph (ii) –

If a risk assessment does not show there is a high risk to electrical safety in performing the testing of the polarity of an installed outlet, a safety observer is not required to observe the performance of the work.

- (2) In this section –

exempt electrical work means –

- (a) electric line work; or
- (b) electrical work on a consumer's electrical installation carried out on the supply side of the main switch on the main switchboard for the installation, if the isolation point of the electrical supply for the installation is not reasonably accessible from the area where the electrical work is carried out.

Example of when isolation point is not reasonably accessible from the area where electrical work is being carried out –

the electrical work is carried out at a place and the isolation point is at a substation located at another place.

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/NZS 4836: Safe working on low-voltage electrical installations about ensuring the safety of persons while performing live work.

safety observer means a person who –

- (a) observes the performance of electrical work; and
- (b) is competent to help a person performing the electrical work; and
- (c) has been assessed in the last 6 months to be competent to rescue a person performing electrical work and provide resuscitation.

Licensed electrical workers have undergone training and acquired experience to ensure they are technically competent and equipped to carry out electrical work

in a way that is electrically safe. This training includes electrical risk management knowledge and will significantly reduce the likelihood of a serious electrical incident or dangerous electrical event occurring. **It does not, however, replace the necessity of carrying out a risk assessment as required in section 12(1)(b) of the Regulation, before commencing electrical work.**

This part (part 5) describes and illustrates the risk / consequence matrix to be used by licensed electrical workers performing live electrical work.

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

5.2 Risk matrix for live work

Training and experience – together with the highly specialised testing and personal protective equipment utilised by a licensed electrical worker – along with the requirements for the performance of live work set down in section 12 of the Regulation, significantly reduces the likelihood of a serious electrical incident or dangerous electrical event occurring. It also reduces the consequences if one does occur.

For these reasons, the matrix shown below differs from that included in Part 4 of this Code and reflects the application of section 12(1) of the Regulation.

Risk priority chart for live work

LIKELIHOOD OF HARM How likely is it to happen?	CONSEQUENCES: Likely severity of harm				
	Insignificant (no injuries)	Minor (first aid treatment only)	Moderate (medical treatment)	Major (extensive injuries)	Catastrophic (death)
Almost certain: expected in most circumstances	Low	Moderate	High	High	High
Likely: will probably occur in most circumstances	Low	Moderate	High	High	High
Moderate: might occur at some time	Low	Moderate	Moderate	High	High
Unlikely: could occur at some time	Low	Low	Moderate	High	High
Rare: may occur only in exceptional circumstances	Low	Low	Low	Moderate	Moderate

This stage of the risk assessment provides the basis for ranking or prioritising risks in order of importance from 'low' to 'high'. When the risk scores for all the risks in the workplace have been compared, the resulting ranking will be a guide to the order in which these risks should be addressed. When more than one risk has the same ranking and not all can be dealt with at once, the risks may need to be reassessed to determine which is the most important to deal with first.

Risk score and statement for live work

Score and statement	Action
High	Review decision to work live. In the event of no practicable alternative to working live, use a competent safety observer and follow mandated actions for live work in accordance with section 12 of the Regulation as listed in this part.
Moderate	Review decision to work live. In the event of no practicable alternative to working live, follow mandated actions for live work in accordance with section 12 of the Regulation as listed in this part.
Low	Follow mandated actions for live work in accordance with section 12 of the Regulation as listed in this part.
Regularly review implemented risk treatment measures.	

For the purposes of this part there are now three categories in terms of risk: low, moderate and high:

Low risk, for example:

- testing of an installed outlet where there is no damage to the outlet and where fault current protection is utilised on the electrical installation; **or**
- fault finding on a domestic washing machine where the circuit is protected by a safety switch.

Case study

An electrical worker is directed to inspect for damage, and test the polarity of, all electrical outlets on the floor of an office building, following reports of broken face plates on outlets.

1. The electrician first inspects the switchboard which supplies the outlets on the floor and identifies that all the power circuits are protected by safety switches mounted on the board.
2. The polarity test is to be undertaken with the circuits energised and the electrician identifies that this is live work, subject to a risk assessment under section 12 of the Regulation. The test instrument to be used is a multi-meter with probes incorporating exposed metal tips, and which has been tested within the previous six months. Personal protective equipment, including insulated gloves and boots, and long sleeved clothing, are also to be used.
3. On referring to the risk assessment matrix, the likelihood of harm is considered *unlikely* and the consequences in the event of an incident likely to be *minor*. On this basis, the electrician concludes that the risk is *low*.
4. Inspection of the outlets then proceeds.

Moderate risk, for example:

- LV testing on a single phase switchboard or equipment where fault current protection is utilised in the electrical installation; **or**
- fault finding on a permanently connected appliance where fault current protection is utilised on the electrical installation.

Case study

An electrician is called out to a domestic property to replace an electric stove.

1. The electrician first inspects the installation for access issues and then the switchboard to determine the location of the isolator for the stove circuit.
2. The work then proceeds in accordance with section 12 of the Regulation, including the use of correct personal protective clothing and equipment.
3. After identifying and isolating the stove circuit at the switchboard, the electrician utilises a 'non-contact electricity proximity detector' on the supply cable at the stove which indicates whether the circuit remains energised and obtains a nil reading. It is then necessary to confirm that the appliance is de-energised by using a suitable test instrument such as a multi-meter.
 - In this case, the environment is dry and well lit with access to the test area being unobstructed. There are no exposed live parts, other than those being tested.
 - The isolation point has been identified and can be easily accessed if necessary.
 - Protective clothing and equipment, including insulated gloves and boots, insulated mat, eye protection, and long sleeved cotton clothing is utilised.
 - The testing equipment to be used has been tested within the previous six months.
4. On referral to the risk assessment matrix, the testing is not indicated as a high risk. With section 12 risk treatment measures in place, the risk of an incident in terms of likelihood and consequences is significantly reduced and is considered low. As such, no safety observer is required.
5. The terminal cover is then removed and the test equipment is connected to the exposed terminals, with the result being a proven de-energised circuit.
6. The electrician proceeds with the installation of the new stove including confirmation of earth continuity and, upon completion, re-energises the stove circuit at the switchboard.
7. It is then necessary to test the polarity of the newly installed stove and to re-fit the terminal cover. As this is to be done with the circuit energised, all section 12 requirements again apply.
8. After considering all these factors, the electrician determines that, in accordance with the risk analysis matrix, the risk is *moderate* and the use of a safety observer is not required.

This case study shows that, by ensuring section 12 risk treatment measures are in place and there are no other risks, the likelihood of an incident occurring during testing is *moderate* and the consequence if one did occur would be no greater than *moderate*, resulting in a *moderate* risk when calculated using the risk assessment matrix.

High Risk, for example:

- performing work on commercial three-phase switchboard equipment; **or**
- carrying out electrical work at a place where the isolation point is at a sub-station located in another place.

Case study

An electrician is required to find the cause of an intermittent partial loss of power on the fifth floor of a multi-level hospital complex housing critical-care monitoring equipment. The power supply for the building is through a three-phase main switchboard located on the ground floor, then via sub-main switchboards situated on each floor.

1. The work to be undertaken requires visual inspection and physical testing of the sub-board and sub-main components. The testing requires includes contact with live conductors in close proximity with other live parts.
2. In this case:
 - the environment is dry and well-lit with access to the test area being unobstructed;
 - there are exposed live parts adjacent to those being tested;
 - the isolation point has been identified and can be readily accessed if necessary;
 - protective clothing and equipment including insulated gloves and boots, an insulated mat, eye protection and long sleeved cotton clothing is utilised; and
 - the testing equipment to be used has been tested within the previous six months.

On referral to the risk assessment matrix, with all section 12 requirements in place, the likelihood of harm is *moderate* and the consequences in the event of an incident occurring are not likely to exceed *moderate*. On that basis, the overall risk is considered *moderate* and no safety observer is required.

3. The testing is then performed and the problem is identified as a faulty circuit breaker which must be replaced. On conferring with the hospital

administration staff, it is found that the power to the equipment serviced by the sub-main installation cannot be disconnected for even a short period, as it is critical to patient care. The electrician determines there is no alternative to the performance of live work under the circumstances. Reference to the risk management matrix confirms that, should the work be undertaken 'live', the likelihood of harm is *likely*, with the consequences being *high*. The work therefore cannot proceed without a qualified safety observer in attendance, and this is arranged.

4. The electrician and safety observer confer on the work to be undertaken and the location and access point for the supply isolator, and all protective equipment as previously used is again deployed by both workers. Appropriate tools are selected to further minimise the risk of an incident during performance of the work. A barrier is erected to prevent access to the work area during the performance of the repair and the safety observer determines the equipment and course of action required in the case of an incident occurring.
5. The electrician then proceeds to undertake the replacement of the faulty circuit breaker with the installation energised, with the safety observer being alert to any emerging danger during the course of the repair.
6. On completion of the work, the sub-main installation is secured and the access barrier removed.

Variables for consideration in risk assessment

The case studies above are provided by way of guidance only and the outcome of the risk assessment can be increased from to *low* to *moderate* or *high* by one or a combination of any other variables, including:

- adequacy of lighting – poor light or shadow;
- access – obstructions to the work area, whether through equipment design or placement;
- surfaces – wet or contaminated areas;
- general environment – dust, insects, vermin damage;
- impact of other site activities – the presence of other trades or work activities in the work area; and
- switchboards with high prospective fault currents.

5.3 Summary

A systematic risk management process is a legal obligation when undertaking live electrical work. The process prescribes a way of discharging the electrical safety obligation of an employer or self-employed person to ensure the person's business or undertaking is conducted in a way that is electrically safe.

The five basic steps in the risk management process provide a process to identify and assess risks, and manage exposure to those risks. When used in conjunction with the risk matrix for live work and working near live electrical parts contained in this Part, the potential exists to significantly reduce the risk of potential death and injury when performing live electrical work.

Part 6 : Treat, Implement, Monitor and Review

6.1 Step 3: Decide on risk treatment measures

The aim of this part is to give detailed and practical advice about how to select risk treatment measures, and implement, monitor and review their effectiveness.

Step three of the risk management process is about deciding how to treat the electrical risks that have been identified. Risk treatment measures must follow an established hierarchy as set out in section 27A of the WHS Act.

6.1.1 The risk treatment hierarchy

An obligation holder⁶ must decide on the appropriateness of risk treatment measures. Obligation holders must start at the top of the hierarchy illustrated below and select measures from the highest order possible.

Risk treatment hierarchy	
A. eliminating the risk; B. if this is not possible, the risk must be minimised by measures considered in the following order: i. substituting the risk with one giving rise to a lesser risk; if not then ii. isolating the risk from anyone who may be at risk; if not then iii. minimising the risk by engineering means; if not then iv. applying administrative measures; if not then v. using personal protective equipment.	Most effective measure ↓ Least effective measure

The risk treatment measures can be divided into three levels:

- the highest level includes measures that address the risk at the source, or where it comes from (i.e. elimination, substitution);
- the second level measures intervene in the risk's course between the source and a worker (i.e. isolation or engineering); and
- the third and lowest level measures are implemented at the point of the worker (i.e. administrative measures, personal protective equipment).

In many cases, it will be necessary to use a combination of measures to appropriately manage exposure to a risk. For example, to minimise exposure

⁶ For information on obligation holders, please refer to Part 1 of this Code.

to a risk involving electricity, the supply of electricity could be disconnected (elimination), safer work procedures (administrative measures) introduced and personal protective equipment provided for workers to use when ensuring electrical parts are de-energised.

Table 1: Risk treatment measures and examples of use

Risk treatment measure	Comment	Examples of use
Elimination	Treat the risk at the source. This is the most effective treatment measure and removes the risk by changing the work processes.	Disconnect electricity, re-route electricity away from work site.
Substitution	Replace the electrical risk with an alternative that has a lower risk.	Battery or air-driven tools could be substituted for electrically powered tools.
Isolation	Remove or separate people from the source of the risk.	Use rubber mats (isolating barrier) to separate workers from being in contact with a concrete floor (conductive path).
Minimise by redesigning	Change the physical characteristics of the plant or workplace to remove or reduce the risk.	Modify a machine so it can be used by remote control; use a limiting device to prevent plant from entering an exclusion zone.
Administrative measures	Use policies, procedures, signs and training to treat risk.	Use a safety observer and/or 'tigertails'.
Personal protective equipment (PPE)	Provide equipment or clothing designed to protect the worker.	Provide rubber-soled boots and insulating gloves.

6.1.2 Consultation

Consultation with workers and others who may be affected by the risks in the workplace is essential at all stages of the risk management process, but particularly in step three, as the workers and others may be able to suggest ways to effectively manage the risks and allow them to operate efficiently in their jobs.

6.1.3 Selecting the most appropriate risk treatment measures

When selecting the most appropriate treatment measures, there are a number of factors that will influence the decision, including workers' opinions, but it is important to keep in mind that the objectives of the Act are to prevent people dying, being injured or becoming ill as a result of exposure to electrical risks at their workplaces.

When selecting a risk treatment measure, it is important to be able to justify why that particular measure was chosen, rather than a higher level measure. For example, there must be a good reason why administrative measures e.g. a sign was chosen to treat the risk instead of choosing a method that eliminates substitutes, isolates or engineers out the risk.

Simply following the risk treatment hierarchy does not necessarily mean compliance with the Act and / or the WHS Act.

When risk treatment measures are selected they should:

- adequately treat exposure to the risk now and will continue to do so over time;
- not create another risk;
- allow workers to do their work without undue discomfort or distress; and
- be proportionate to the degree and nature of the risk (i.e. high risk and severe consequences should have substantial permanent solutions).

6.2 Eliminate the risk

Eliminating the risk completely is the most effective treatment and must always be attempted first when deciding on risk treatment measures. This may mean discontinuing dangerous work practices, removing dangerous substances, or introducing new equipment (e.g. de-energising lines or re-locating plant away from the vicinity of electric lines).

6.2.1 Safe design

One of the ways to eliminate a risk at the source is by addressing safety issues during the design stage of equipment, structures and processes. For example, determining lay-out or set-up of a work area at the design stage of the construction of a workplace can eliminate electrical risks and reduce the risks of workers being injured in that workplace or other negative effects on the environment and people outside the workplace.

6.2.2 Policies and procedures

A high percentage of electrical risks can be eliminated or minimised at the source through sound policies and procedures relating to purchasing, installing and commissioning plant, materials and facilities. For example, purchase electrical equipment that is fit for purpose and ensure workers are properly trained to use the equipment.

6.3 Prevent or minimise exposure to the risk

If an electrical risk cannot be eliminated, there are a number of treatment measures that can be used alone, or in combination with other measures, to prevent or minimise exposure to the risk.

Substitution involves replacing the risk with one that presents a lower and more manageable risk. Examples of substitution include:

- replacing plant or equipment with a more suitable type, such as substituting conductive metal scaffolding with non-conductive scaffolding; and
- replacing a pedestal fan with a ceiling fan in a restaurant kitchen to eliminate the tracking of an electric cord across a damp floor; insulation on cord may become worn and frayed and cause an electrical risk.

Isolation refers to isolating or separating the risk from the person, or the person from the risk. Examples of isolation include:

- installing screens or barriers around electrically hazardous areas to prevent direct or indirect contact with live electrical parts;
- enclosing or guarding dangerous electrical equipment to prevent encroachment into an exclusion zone; and
- isolating the electricity supply from electrical equipment.

Engineering measures (redesign) involves changing the design of the workplace, equipment or work process to minimise the risk. It requires thinking about ways the work could be done differently to make the workplace safer.

Examples of engineering measures include:

- in crane work, use limiting or warning devices to prevent the jib from entering the exclusion zone; or warning the operator before the jib can enter the exclusion zone;
- combining tasks, such as using an electrically safe elevated work platform and spray-painting;
- changing procedures to minimise hazardous tasks, such as hand sanding near electrical wiring rather than using a powered device; and
- using insulated tools and equipment to perform electrical work where there is no alternative to working live; for example, using an insulated fibreglass extension ladder.

6.3.1 When exposure to the risk cannot be minimised by other means

Administrative risk treatment measures and the use of personal protective equipment are lowest on the list of measures. Risk treatment measures developed at this level should NOT be relied on as the primary means of risk treatment until the options higher in the list have been exhausted. These measures require enforcement and commitment by the organisation's management, together with behaviour modification of workers. They are dependent on proper training and appropriate human behaviour to work effectively and therefore, tend to be less successful.

Generally, administrative risk treatment measures and personal protective equipment should only be used:

- when there are no other practical risk treatment measures available (as a last resort); or
- to supplement other risk treatment measures (i.e. as back-up).

Administrative risk treatment measures involve using procedures or instructions to minimise exposure to a risk. It is often necessary to use these risk treatment measures in conjunction with other measures. Examples of administrative risk treatment measures include:

- limited entry to or limited time spent in electrically hazardous areas;
- adequate supervision;
- training in safe work procedures, such as training in the operation of an elevating work platform;
- development of safe work procedures or safe systems of work and subsequent instruction and training of workers in these procedures for example safety observer training;
- preventive maintenance and housekeeping procedures; and
- warning signs such as 'tigertails' to draw attention to overhead electric lines.

Personal protective equipment (PPE) is often used in combination with other risk treatment measures as a final barrier between the worker and the risk. This measure does not treat the risk at the source. The success of this measure depends on the personal protective equipment being:

- chosen correctly (i.e. what will it be used for and the comfort and requirements of the user);
- Be compliant to a relevant Australian standard;

- worn correctly at all times when issued;
- used correctly within limitations; and
- maintained in good condition and tested as required.

Examples of personal protective equipment include:

- protective eyewear, such as goggles, safety glasses and face shields;
- electrical insulating gloves; and
- fire resistant clothing, aprons, boots and gloves.

6.4 Step 4: Implement risk treatment measures

6.4.1 Implementation plans

After the most appropriate control measures available to control the electrical risks and prevent or minimise risks in the workplace have been identified, the next step is to put these measures in place. This involves undertaking those activities necessary to allow the selected measures to function or operate effectively.

Effective implementation usually involves the development of an implementation plan. The plan should:

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

An implementation plan could also include:

- the process for documenting and reporting progress in achieving implementation, including who will monitor the progress;
- procedures to be used for consultation and communication of health and safety information, including any new risk treatment measures, to workers and other relevant people; and
- emergency plans and procedures.

6.4.2 Additional steps for implementation

The following steps will also make the implementation of risk treatment measures more effective.

Develop safe work procedures

Written safe work procedures should be developed to ensure that both existing or new treatment measures are effective. Management, supervisor and worker responsibilities should be clearly defined in the safe work procedures. These procedures should also include emergency and contingency procedures, which should be tested regularly, and make provision for electrical safety monitoring.

Communicate with workers about implementation

Management should inform workers and others about the types of risk treatment measures that will be implemented, how they will be implemented and who will be involved in the implementation. It is also important to explain the reasons for the changes, how they will benefit the workers' safety, and the consequences if they fail to follow the treatment measures.

Provide workers with training and instruction

It is important to provide training and instruction for the workers, supervisors and others in relation to any new risk treatment measures and the application of any safe work procedure that has been introduced. Supervisors are responsible for developing training programs for workers to ensure they have the necessary expertise to carry out their jobs. Managers and supervisors should ensure workers who are returning to work after being absent during the implementation stage receive training and instruction about the risk treatment measures or procedures that have been implemented. Records of such training should be recorded and training should be reviewed and updated as required.

Supervise workers using risk treatment measures

Supervisors should be responsible for:

- making sure new workers are aware of the risk treatment measures;
- ensuring that new measures are being implemented and used as planned, and correcting behaviour where necessary; and
- ensuring that the safe work procedures are being followed by the workers.

Generally supervisors provide ongoing guidance, coaching and assistance to

workers, which is important when new risk treatment measures are implemented or existing measures are changed.

Enforce risk treatment measures

It is important for management to develop enforcement procedures to ensure work procedures are followed and treatment measures are used appropriately. These should detail the consequences for workers who do not follow the procedures, such as wearing their PPE correctly.

Enforcement should be integrated into the organisation's HR/IR processes and should be both formal (recorded/planned) and informal (e.g. supervisors routinely checking and enforcing).

Record the processes

The Regulation requires a workplace to keep certain records for a specified period of time. Other records ensuring health and safety at a workplace should be kept as part of the risk management process and it is important that everyone in the workplace is aware of record keeping requirements, which records are accessible and where they are kept. Record keeping is a good work practice and should increase the effectiveness of the workplace.

Set out maintenance requirements

Work procedures should specify maintenance requirements to ensure the ongoing effectiveness of the new and existing risk treatment measures. Maintenance is the activity involved in:

- keeping something in good working order;
- keeping a machine or a system functioning or in operation; and
- making sure that the risk treatment measures are validated.

Consult on the implementation process

Consultation between workers, supervisors and managers will allow feedback to be given on whether:

- risk treatment measures have been implemented according to the plan;
- the risk treatment measures are effective; and
- any new problems have been caused by the new risk treatment measures.

The process may then need to be re-evaluated and improved, or more effective risk treatment measures considered.

6.5 Step 5: Monitor and review

The final step in the risk management process involves critically monitoring and reviewing the effectiveness of the risk treatment measures that have been implemented to prevent or minimise the risks. The monitoring process will identify whether risk treatment measures are being implemented according to the plan, whether they are working as intended and whether any new problems have arisen. Consider whether there is any gap between what was planned and what is actually happening in the workplace.

The review process requires a critical evaluation of whether the current risk treatment measures are enough to satisfy the obligations under the Act, or whether something else could be done to minimise the risks further.

The risk management process is a common sense approach that should answer the question:

Is my workplace a healthy and safe workplace for all who work there and for all who come in contact with it?

6.5.1 Monitoring the effectiveness of risk treatment measures

When monitoring the effectiveness of risk treatment measures, it may be helpful to ask the following questions:

- **Have the chosen risk treatment measures been implemented as planned?**
 - Are the chosen measures in place?
 - Are the measures being used?
 - Are the measures being used correctly?
- **Are the chosen risk treatment measures working?**
 - Have any the changes made to manage exposure to the assessed risks resulted in what was intended?
 - Has exposure to the assessed risks been eliminated or adequately reduced?
- **Are there any new problems?**
 - Have the implemented treatment measures introduced any new problems?
 - Have the implemented treatment measures resulted in the worsening of any existing problems?

To answer these questions:

- consult with workers, supervisors and health and safety representatives;
- consult and monitor incident reports; and
- review safety committee meeting minutes where possible.

6.5.2 Reviewing the risk management process

Set a date for the review of the risk management process. When reviewing, check if:

- the process that is currently in place is still valid;
- things have changed that could make the operating processes or system outdated;
- technological or other changes have affected the current workplace; and
- a different system should be used altogether.

The review process may be more critical for some businesses than for others. For example, industries that rely heavily on technology, such as hospitals, will need to review their risk management process more often to keep up with technology development.

6.6 Applied case study – Treat, monitor and review

Following the risk assessment, each risk has to be treated. Risk treatment measures should be selected from the risk treatment hierarchy. Once they have been decided, an implementation plan is developed. This example uses the form 'Risk assessment and treatment' (Form 2), included in Appendix A, and focuses on only one of the selected risks.

Workplace area or grouping: Bakery XYZ Retail Pty Ltd Ref. no:1/08
 Form completed by: C. Bloggs (print name) _____ (sign)
 Date form completed: 26 / 11 / 08

Risk identification

Risk: *Plug-in electrical equipment toaster – shock risk.*
 Associated risk: *Person using toaster could receive a shock if toaster has been splashed with water.*
 Specific circumstances relating to the risk: *Toaster is located adjacent to hand washing facilities. It is a hygiene requirement that staff are required to wash hands before and after using any equipment.*
 Persons at risk: *All workers who use the toaster.*

Risk assessment

Existing risk treatment measures (if any):
 Likelihood: (tick) Almost certain Likely Moderate Unlikely Rare
 Consequences: (tick) Catastrophic Major Moderate Minor Insignificant
 Risk rating: Acute

Risk treatment

This risk must be treated immediately. The toaster must not be used again until the risk has been eliminated.
Possible risk treatment options:
 Elimination: *Stop using the toaster. This would mean ceasing to make toast for cash paying customers who make up a significant part of the early morning client base. Business revenue would suffer significantly.*
 Substitution. *Not an option as there is no other way to meet client demand for fresh toast.*
 Isolation or Engineering. *This is an option as with redesign, the toaster can be moved to a safer part of the work area. It will mean one day's loss of operation but will result in a safe operating environment.*
Cost of moving toaster will be approximately \$600. This is made up of lost sales \$300 (toast and associated tea/coffee) and cost of building new shelf for toaster \$300.
 Administrative or personal protective equipment. *Clearly worded signs could be erected to encourage staff to examine the toaster for possible splashes of water before use.*
 Preferred risk treatment options (and why): *Re-design of work area to locate toaster well away from hand washing area.*
This will be a permanent solution and will ensure that no water will splash on to electrical parts.

Implementation plan

Treatment option	Associated activities	Resources required	Person(s) responsible	Proposed implementation date	Sign off and date	Scheduled review date
Re-design / engineering	Stop using toaster until solution in place. Coffee/ tea can still be provided.	\$600	Store manager	31 March 2009	XXX 01/02/09	Three months after implementation date
Elimination – stop using the toaster	While coffee and tea can still be provided, there is a valuable client group that buys toast and or a hot drink each day.	No resources but would mean a loss of revenue				

Review – 1 June 2009

- Are risk treatment measures in place?
- Yes. Toaster had been moved to safe area.
 - ~~No, comment (why not?):~~
- Are risk treatment measures preventing or minimising the risk?
- Yes. The new location for the toaster, away from the hand washing facilities will prevent water from being splashed on to toaster and also will avoid workers from using the machine with wet or damp hands.
 - ~~No, comment (why not?):~~
- Are there any new problems with the risk?
- No.
 - ~~Yes, comment (what are they?):~~

Example: Electrical risk register

Fill in this form for each workplace area.

Form completed by: <i>C Bloggs (WHSO)</i> (print) (sign)							
Date form completed: <i>27/11/08</i>							
Ref. no	Risk	Associated risk	Risk rating	Control measures	Control measure implemented?		Review date
					Yes	No	
1	Plug in electrical equipment	Electrical shock from faulty equipment	H	Safety switch is installed, which reduces risk. Continue yearly testing and inspection of all electrical equipment.	Yes		Test every 3 months
2	Poor lighting in storage area (due to flour build-up on light fittings)	Trip risk as well as electrical shock risk.	M	Clean light fittings and replace tubes. Ensure all cleaning and replacement work is carried out by an electrician		No	1 June 09
3	Low overhead powerlines outside shop	Delivery truck or other striking powerlines and receiving shock	A	Install underground powerlines. Develop a safe system of work to ensure an exclusion zone around the powerlines is not breached – worker to assist delivery drivers to avoid the lines.		No No	1 June 09
4	Cleaning around electrical equipment	Water damage to electrical equipment, causing shock and damage to equipment	A	Avoid hosing where possible – use mops to minimise splashing water around electrical equipment. Develop a safe system of work for hosing down – turn power off during cleaning.	Yes	No	Every week by supervisor 1 June 09
<p>Comments: (Are risk treatment measures preventing or minimising the risks? Have any new problems been introduced?)</p> <p>Ref. no. 1</p> <p>Ref. no. 2</p> <p>Ref. no. 3</p> <p>Ref. no. 4</p>							

Appendix A: Forms for record keeping

Form 1: Electrical risk identification

Fill in one form for each workplace area or grouping.

Workplace area or grouping:	Form completed by: _____	Date form completed: ____ / ____ / ____
	(print name) _____	

	(sign) _____	

Identify the task or activity	What are the electrical risks for each activity? (and Ref. no.)	Date	Initials

Form 2: Risk assessment and treatment

Fill in one form for each electrical risk identified at the workplace.

Workplace area or grouping:		Ref. no:								
Form completed by:		(print name)				(sign)				
Date form completed: / /										
Electrical risk identification										
Risk:										
Specific circumstances relating to the risk:										
Persons at risk:										
Risk assessment										
Existing risk treatment measures (if any):										
Likelihood: (tick)	Almost certain	<input type="checkbox"/>	Likely	<input type="checkbox"/>	Moderate	<input type="checkbox"/>	Unlikely	<input type="checkbox"/>	Rare	<input type="checkbox"/>
Consequences: (tick)	Catastrophic	<input type="checkbox"/>	Major	<input type="checkbox"/>	Moderate	<input type="checkbox"/>	Minor	<input type="checkbox"/>	Insignificant	<input type="checkbox"/>
Risk treatment										
Possible treatment options:										
Elimination:										
Substitution, Isolation or Engineering:										
Administrative or personal protective equipment:										
Preferred treatment options (and why):										
Implementation plan										
STOP										
If the risk is associated with live electrical work, review and confirm the necessity to work live. Refer to risk matrix for live work*										
Treatment option	Associated activities	Resources required	Person(s) responsible	Proposed implementation date	Sign off and date	Scheduled review date				
Review										
Are risk treatment measures in place?										
<ul style="list-style-type: none"> • Yes • No, comment (why not?): 										
Are risk treatment measures preventing or minimising the risk?										
<ul style="list-style-type: none"> • Yes • No, comment (why not?): 										
Are there any new problems with the risk?										
<ul style="list-style-type: none"> • No • Yes, comment (what are they?): 										

Form 3: Risk identification

Fill in one form for each workplace area or grouping.

Workplace area or grouping: _____ _____ _____ _____	Form completed by: _____ (print name) _____ _____ (sign)	Date form completed: _____ / _____ / _____
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What are the electrical risks* for each activity (and Ref. no.)	Who is at risk?	Specific circumstances relating to the risk	Description of risk

* Note: There may be more than one associated risk.

Form 5: Risk treatment measures

Fill in one form for each risk.

Workplace area or grouping:	Form completed by:	Date form completed:
Risk (Ref. no.):	(print name)	/ /
	(sign)	/ /

Risk Ref. no.	Risk rating (from Form 4)	Possible treatment option(s) and how it will control the risk	Preferred treatment option(s) and why
		Elimination:	
		Substitution:	
		Isolation:	
		Engineering:	
		Administrative:	
		Personal protective equipment:	
Comments:			

Form 6: Risk treatment implementation plan

Fill in one form for each risk.

Workplace area or grouping: Risk (Ref. no.): _____ _____ _____	Form completed by: (print name) _____ _____ _____ (sign) _____	Date form completed: _____ / _____ / _____
---	---	---

Preferred treatment option(s)	What needs to be done?	Resources needed	Person(s) responsible	Date Implementation due by	Implementation completed		Date for review
					Signature	Date	

Form 7: Review of risk treatment measures

Fill in one form for each risk.

Workplace area or grouping: Risk: (Ref. no.)	Form completed by: (print name)	Date form completed:
		/ /
	(sign)	/ /

Treatment measure(s)	Scheduled review date	Current date	Comment (if necessary)	Are treatment measures in place?		Are measures preventing or minimising exposure to the risk?		Are there any new problems?	
				Yes	Date measure implemented	No, comment	Yes	No, comment	No

Next review of electrical safety risk management process due: / /

Appendix B: Glossary of terms used in this Code

A **dangerous electrical event** (see section 12 of the Act) is any of the following:

- The coming into existence of circumstances in which a person is not electrically safe, if:
 - the circumstances involve high voltage electrical equipment; and
 - despite the coming into existence of the circumstances, the person does not receive a shock or injury.
- The coming into existence of both the following circumstances:
 - if a person had been at a particular place at a particular time, the person would not have been electrically safe; and
 - the person would not have been electrically safe because of circumstances involving high voltage electrical equipment.
- An event that involves electrical equipment and in which significant property damage is caused directly by electricity or originates from electricity.
- The performance of electrical work by a person not authorised under an electrical work licence to perform the work.
- The performance of electrical work by a person if, as a result of the performance of the work, a person or property is not electrically safe.

Examples for the above paragraph:

- The connection of electrical equipment to a source of supply involving incorrect polarity or other incorrect connection.
- The performance of electrical work as a result of which an exposed wire is left in circumstances in which it can be energised by the operation of a switch or circuit breaker or the insertion of a fuse.
- The discovery by a licensed electrical worker of electrical equipment that has not been marked as required under this Act.

De-energise means the process of disconnecting lines or apparatus from all sources of electrical energy usually by the process of switching. De-energised does not mean isolated or discharged, or both.

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;
- (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 risk (see section 10(1) 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 (see section 10(3) of the Act), for a person or property, means the person or property is electrically safe.

Electrically safe (see section 10(2) of the Act) means:

- for a person or property, that the person or property is free from electrical risk;
- for electrical equipment or an electrical installation, that all persons and property are free from electrical risk from the equipment or installation;
- for the way electrical equipment, an electrical installation or the works of an electricity entity are operated or used, that all persons and property are free from electrical risk from the operation or use of the equipment, installation or works;
- for the way electrical work is performed, that all persons are free from electrical risk from the performance of the work;
- for the way a business or undertaking is conducted, that all persons are free from electrical risk from the conduct of the business or undertaking; and
- for the way electrical equipment or an electrical installation is installed or repaired, that all persons are free from electrical risk from the installing or repairing of the equipment or installation.

Free from electrical risk (see section 10(4) of the Act), for a person or property, means that the electrical risk to the person or property is as low as reasonably achievable, having regard to:

- likelihood of harm; and
- likely severity of harm.

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.

Plant (see schedule 3 of the WHS Act) includes:

- machinery, equipment, appliance, pressure vessel, implement and tool;
- personal protective equipment;
- a component of plant and a fitting, connection, accessory or adjunct to plant; and
- specified high risk plant⁷ (unless otherwise stated).

⁷ Refer *Workplace Health and Safety Act 1995* schedule 2.

Regular or scheduled intervals: The WHS Act prescribes that if a workplace has a WHSO, they must assess the risks in the workplace at least every 12 months. Therefore, for the purposes of this code, a regular interval is any period of time not more than 12 months.

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

Risk assessment: The process of identifying, analysing and evaluating a risk, for the purposes of prioritising and taking action to treat the risk. Assessing a risk involves considering the likelihood of harm arising from an electrical risk and the severity of the consequences that could result. This process may also be known as risk profiling.

Risk identification and evaluation systems include:

- workplace inspections, where electrical risks can be observed or inferred from observations at the workplace;
- safety tours, which can be either systematic or ad hoc walk-through surveys of a workplace;
- Job Safety Analysis (JSA), which is a semi-formal risk analysis, derived from work-study techniques. It uses a task analysis to identify accident potential within a job;
- probabilistic risk assessments that utilise fault tree analysis, failure mode and effects analysis and event tree analysis; these systems are mostly used in risk reduction programs; and
- Management Oversight and Risk Tree (MORT), which uses a logic tree to analyse original functions required in the safe management of high risk technologies; this can also be used during accident investigation and safety audits.

Serious electrical incident is an incident involving electrical equipment if, in the incident:

- (a) a person is killed by electricity;
- (b) a person receives a shock or injury from electricity, and is treated by or under the supervision of a doctor; or
- (c) a person receives a shock or injury from electricity at high voltage, whether or not the person is treated for the shock or injury by or under the supervision of a doctor.

The Act means the *Electrical Safety Act 2002*.

The Regulation means the *Electrical Safety Regulation 2002*.

The WHS Act means the *Workplace Health and Safety Act 1995*.

WHSO: Workplace Health and Safety Officer, as prescribed under the *Workplace Health and Safety Act 1995*.

WHSR: Workplace Health and Safety Representative, as prescribed under the *Workplace Health and Safety Act 1995*.

Appendix C: List of Electrical Safety Codes of Practice

- *Electrical Equipment Rural Industry 2010*
- *Electrical Work 2010*
- *Working Near Exposed Live Parts 2010*
- *Works (protective earthing, underground cable systems and maintenance of supporting structures for powerlines) 2010*



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Electrical Safety Office Queensland
Telephone **1300 650 662**
Website **www.justice.qld.gov.au**

