

# ELECTRICAL

## PRACTICES FOR CONSTRUCTION WORK

CODE OF PRACTICE 2007

**Disclaimer**

This publication may contain occupational health and safety and workers compensation information. It may include some of your obligations under the various legislations that WorkCover NSW administers. To ensure you comply with your legal obligations you must refer to the appropriate legislation.

Information on the latest laws can be checked by visiting the NSW legislation website ([www.legislation.nsw.gov.au](http://www.legislation.nsw.gov.au)) or by contacting the free hotline service on 02 9321 3333.

This publication does not represent a comprehensive statement of the law as it applies to particular problems or to individuals or as a substitute for legal advice. You should seek independent legal advice if you need assistance on the application of the law to your situation.

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## WHAT IS AN INDUSTRY CODE OF PRACTICE?

An approved industry code of practice is a practical guide to employers and others who have duties under the *Occupational Health and Safety Act 2000* (OHS Act) and the *Occupational Health and Safety Regulation 2001* (OHS Regulation) with respect to occupational health, safety and welfare.

An industry code of practice is approved by the Minister administering the OHS Act. It comes into force on the day specified in the code or, if no day is specified, on the day it is published in the NSW Government Gazette. An approved industry code of practice may be amended from time to time (or it may be revoked) by publication in the Gazette.

An approved industry code of practice should be observed unless an alternative course of action that achieves the same or a better level of health, safety and welfare at work is being followed.

An approved industry code of practice is intended to be used in conjunction with the requirements of the OHS Act and the OHS Regulation but does not have the same legal force. An approved industry code of practice is advisory rather than mandatory. However, in legal proceedings under the OHS Act or OHS Regulation, failure to observe a relevant approved industry code of practice is admissible in evidence to establish an offence under the OHS Act or OHS Regulation.

A WorkCover Authority inspector can draw attention to an approved industry code of practice in an improvement or prohibition notice as a way of indicating the measures that could be taken to remedy an alleged contravention or non-compliance with the OHS Act or OHS Regulation. Failure to comply with an improvement or prohibition notice without reasonable excuse is an offence.

In summary an approved **INDUSTRY CODE OF PRACTICE**:

- ✓ gives practical guidance on how health, safety and welfare at work can be achieved;
- ✓ should be observed unless an alternative course of action that achieves the same or a better level of health, safety and welfare in the workplace is being followed;
- ✓ can be used in support of the preventive enforcement provisions of the *Occupational Health and Safety Act*;
- ✓ can be used to support prosecutions for failing to comply with or contravening the OHS Act or OHS Regulation.

## **PREFACE**

The aim of this code of practice is to provide the construction industry with a set of safety measures applicable to electrical practices for temporary electrical installations and electrical appliances used during construction work. It sets out the minimum requirements for temporary construction wiring and the safe use, inspection and testing of electrical plant and plug-in electrical equipment. It provides practical advice on implementing the requirements of the *Occupational Health and Safety Act 2000* and the *Occupational Health and Safety Regulation 2001*.

The code of practice will assist employers, self employed persons, employees, contractors, and other parties involved with electrical practices for construction work.

Use this code of practice to assess the effectiveness of your present arrangements for dealing with electrical practices associated with construction work, and to check that all sources of electrical risk have been identified and dealt with. If you are setting up a new business, this code of practice can serve as your step by step guide to establishing the minimum safety requirements applicable to electrical practices on construction sites.

This revised code of practice was developed in consultation with members of the construction industry, including relevant unions and employer bodies and replaces the first edition of the *Code of Practice: Electrical practices for construction work*, which commenced on 1 February 1992.

## **ACKNOWLEDGEMENT**

In developing this code of practice WorkCover NSW has drawn on information contained in codes of practice and standards issued by other State regulators or organisations. WorkCover NSW acknowledges the following publications, which have been incorporated in parts of this code.

- Industry Standard for Electrical Installations on Construction Sites – This document is jointly published by Energy Safety Victorian and WorkSafe Victoria
- The joint Australian and New Zealand Standard, AS/NZS 3012 Electrical installations – Construction and demolition sites.

# CHAPTER 1 – ESTABLISHMENT

## 1.1 Title

This is the *Code of practice: Electrical practices for construction work*.

## 1.2 Purpose

This code of practice provides practical guidance on minimum safety requirements for electrical practices during construction work in order to protect the safety of workers.

## 1.3 Scope

This code of practice sets out safety requirements for electrical installations associated with construction workplaces in New South Wales. It also contains provisions for the connection, use and testing of fixed or portable electrical equipment, tools, appliances and associated flexible extension cords, connected to such installations.

This Chapter 1 is introductory, describes the purpose of this code, and provides definitions. Chapter 2 explains the regulatory principles in the occupational health and legislation, which this code is intended to facilitate. The technical requirements for compliance with this code of practice are set out in Chapters 3 to 9 inclusive.


The code does not apply to mines, which are the subject of other regulatory controls.

This code should be read in conjunction with the joint Australian and New Zealand Standard AS/NZS 3012 Electrical installations – Construction and demolition sites ('AS/NZS 3012'), which has been adopted as a code under the *Code of Practice: Technical Guidance*. Reference should be made to the standard for matters not covered in this code. In addition the code provides some additional or altered provisions – in the event of any such inconsistencies between this code and AS/NZS 3012, this code should prevail.

This code applies in addition to the requirements of the *Code of practice for low voltage electrical work*, which provides requirements and practical guidance for persons working on or near low voltage electrical installations.

**Note:** The Code has been revised and was Gazetted on the 19th January 2007.

**WARNING**



In accordance with the statutory risk control requirements of the OHS Regulation, the practice of working on an energised (live) low voltage installation cannot usually be justified. It is the responsibility of the employer, self employed person, principal contractor and the controller of the premises, to ensure that this is not done other than in situations where it is necessary in the interests of safety and the risk of harm would be greater if that part of the installation's circuits or apparatus were to be de-energised.

## 1.4 Authority

This is an industry code of practice approved by the Minister for Commerce under section 43 of the *Occupational Health and Safety Act 2000*, on the recommendation of the WorkCover Authority of New South Wales ('WorkCover NSW').

## 1.5 Commencement

This code takes effect on Friday, 2 March 2007.

## 1.6 Revocation

This code of practice replaces the first edition of the *Code of practice: Electrical practices for construction work*, published in the *Government Gazette* on 1 February 1992, which is hereby revoked as provided by section 45 of the *Occupational Health and Safety Act 2000*.

## 1.7 Interpretation

### 1.7.1 Recommended practices

Words such as 'should' indicate recommended courses of action. 'May' or 'consider' indicate a possible course of action the duty holder should consider. However, you may choose an alternative method of achieving a safe system of work. For a further explanation, see 'What is an industry code of practice'.

### 1.7.2 Legal obligations

Words such as 'must', 'requires' or 'mandatory' indicate obligations, which must be complied with. Failure to comply with the code can be used as evidence in proceedings for an offence against the OHS Act or OHS Regulation (where the code is relevant to any matter, which it is necessary for the prosecution to prove to establish the commission of the offence).

## 1.8 Applicable legislation

Consult the OHS Act and OHS Regulation for the specific legal requirements regarding occupational health and safety responsibilities.

### Other significant legislation:

The *Electricity (Consumer Safety) Regulation 2006*, which is administered by the Office of Fair Trading, requires electrical installations and electrical installation work, including that associated with construction workplaces, to:

- (a) comply with AS/NZS 3000 – Electrical Installations (Australian/New Zealand Wiring Rules) as amended
- (b) be tested by a licensed electrician after completion of the work and prior to connection to supply for normal use
- (c) carry out a safety and compliance test and issue a *Certificate of Compliance – Electrical Work* in accordance with the above electrical safety legislation
- (d) be notified to the owner or principal contractor in charge of the electrical installation
- (e) be notified to the local electricity network operator for possible inspection in accordance with the above electrical safety legislation.

**Note:** The *Electricity (Consumer Safety) Regulation 2006* replaces the *Electricity Safety (Electrical Installations) Regulation 1998*.

The *Electricity (Consumer Safety) Act 2004*, which replaces the *Electricity Safety Act 1945*, is also relevant.

## 1.9 Definitions

<b>authorised representative</b>	of an industrial organisation of employees means an officer of that organisation who is authorised under the <i>Industrial Relations Act 1996</i> .
<b>auxiliary socket-outlet panel</b>	means a socket-outlet assembly, supplied by a fixed wired dedicated final subcircuit of construction wiring and protected by a 30 mA RCD and overcurrent breaker at final subcircuit origin, used to eliminate the need to run long flexible extension cords from a switchboard. These devices are also known as 'auxiliary boards or satellite boards'.
<b>competent person</b>	for any task means a person whom the person in charge of the construction work ensures they have acquired through training, qualification, experience, or a combination of them, the knowledge and skills enabling that person to carry out the task correctly.
<b>construction site</b>	means the site of construction work (either in progress or suspended).
<b>construction wiring</b>	means wiring systems installed to provide electrical supply for construction work, and is not intended to form part of the permanent electrical installation. Construction wiring does not include flexible extension cords or flexible cables used to connect portable plug-in electrical equipment or luminaries to a socket-outlet.
<b>construction work</b>	means any of the following: <ul style="list-style-type: none"><li>(a) excavation, including the excavation or filling of trenches, ditches, shafts, wells, tunnels and pier holes, and the use of caissons and cofferdams</li><li>(b) building, including the construction (including the manufacturing of prefabricated elements of a building at the place of work concerned), alteration, renovation, repair, maintenance and demolition of all types of buildings</li><li>(c) civil engineering, including the construction, structural alteration, repair, maintenance and demolition of, for example, airports, docks, harbours, inland waterways, dams, river and avalanche and sea defence works, roads and highways, railways, bridges and tunnels, viaducts, and works related to the provision of services such as communications, drainage, sewerage, water and energy supplies.</li></ul>
<b>contractor</b>	means a person responsible for carrying out work at a construction site. Depending on the contractual arrangements, which are in place, the contractor may be an employer, a self employed person or a person who has control of premises, plant or substance within the meaning of the OHS Act.
<b>electrical contractor</b>	means an individual, partnership or corporation who intends to contract, sub-contract and or advertise to carry out any electrical wiring work (including domestic, commercial or industrial).
<b>electrical wiring work</b>	means the actual physical activity of installing, repairing, altering, removing or adding to an electrical installation or the supervising of that work. <b>Note:</b> This is defined under the <i>Electricity (Consumer Safety) Act 2004</i> .
<b>employee</b>	means an individual who works under a contract of employment or apprenticeship.

<b>employer</b>	means a person who employs persons under contracts of employment, or apprenticeship.  <b>Note:</b> In some chapters of the OHS Regulation, the term 'employer' includes a self employed person in relation to duties to other persons.
<b>festoon lighting</b>	means a system of lighting in which lamp holders are supported by the supply cable.
<b>flexible extension cord</b>	A flexible cable, no wire of which exceeds 0.31mm diameter and no conductor of which exceeds 4mm <sup>2</sup> cross sectional area, and having not more than five cores.
<b>high risk construction work</b>	means any of the following construction work: <ul style="list-style-type: none"> <li>• involving structural alterations that require temporary support</li> <li>• at a height above 3 metres</li> <li>• involving excavation to a depth greater than 1.5 metres</li> <li>• demolition work for which a licence is not required</li> <li>• in tunnels</li> <li>• involving the use of explosives</li> <li>• near traffic or mobile plant</li> <li>• in or around gas or electrical installations</li> <li>• over or adjacent to water where there is a risk of drowning.</li> </ul>
<b>hiree</b>	means the person or business, which receives the equipment from the hirer.
<b>hirer</b>	means the person or business which offers the equipment for hire.
<b>IP Classification</b>	means the degree of protection in accordance with the Australian Standard, AS 60529 – Degrees of protection provided by enclosures (IP Code).  <b>Note:</b> The International Protection classification is usually written as 'IP' followed by two numbers and sometimes, an additional letter. The first number designates a degree of 'protection against solid objects' and 'protection of persons against access to hazardous parts'. The second number designates a degree of 'protection against entry of water with harmful effects'.
<b>inspector</b>	means an inspector appointed under the OHS Act.
<b>licensed electrician</b>	means a person who is the holder of a Qualified Supervisor Certificate – Electrician as defined under the <i>Home Building Act 1989</i> .
<b>OHS Act</b>	means the <i>Occupational Health and Safety Act 2000</i> .
<b>OHS Regulation</b>	means the <i>Occupational Health and Safety Regulation 2001</i> .
<b>permanent wiring</b>	means a system of wiring that forms part of the permanent electrical installation of a building or site and meets the requirements for fixed wiring as defined in the Australian Standard AS/NZS 3000 Electrical Installations – Australian/New Zealand Wiring Rules (AS/NZS 3000 – Wiring Rules) as amended.
<b>plant</b>	includes any machinery, equipment or appliance.
<b>portable plug in equipment</b>	covers such items as hand held portable or transportable electrical welders, portable electrical power tools, electrical appliances and flexible extension cords.

<b>principal contractor</b>	<p>(sometimes referred to as main or head contractor) means the person with the overall responsibility for the construction work.</p> <p><b>Note:</b> Depending on the contractual arrangements, which are in place, the principal contractor may also be regarded as an employer, self employed person or a person in control under the OHS Act. Principal contractors have special duties under the OHS Regulation.</p>
<b>portable socket-outlet assembly</b>	<p>means an assembly, other than a flexible extension cord, having a heavy duty sheathed flexible cord, one or more socket-outlets, an overload protective device, a residual current device and a plug intended for connection to a low voltage socket-outlet. It may also incorporate a reeling or coiling arrangement.</p>
<b>record</b>	<p>includes any form in which information is stored on a permanent basis or from which information may be reproduced.</p>
<b>relocatable structure</b>	<p>includes site sheds, portable sheds, transportable construction huts, and relocatable construction premises.</p>
<b>residual current device (RCD)</b>	<p>means a device intended to isolate supply to protected circuits, socket outlets or electrical equipment in the event of a current flow to earth, which exceeds a predetermined value.</p>
<b>safe work method statement</b>	<p>means a statement that:</p> <ul style="list-style-type: none"> <li>• describes how work is to be carried out</li> <li>• identifies the work activities assessed as having safety risks</li> <li>• identifies the safety risks</li> <li>• describes the control measures that will be applied to the work activities, and includes a description of the equipment used in the work, the standards or codes to be complied with, the qualification of the personnel doing the work and the training required to do the work.</li> </ul>
<b>self employed person</b>	<p>means a person who works for gain or reward otherwise than under a contract of employment or apprenticeship, whether or not employing others.</p> <p><b>Note:</b> In some chapters of the OHS Regulation, the term employer includes a self employed person.</p>
<b>single unit dwelling house</b>	<p>means</p> <ul style="list-style-type: none"> <li>(i) in relation to a proposed building, a building that is designed, or designed principally, as a separate residence for one family or person</li> <li>(ii) in relation to an existing building, a building that is designed and used, or designed and used principally, as a separate residence for one family or person</li> <li>(iii) in the case of a dual occupancy a building that is designed to include two dwellings erected side by side or joined together to form a single building.</li> </ul> <p><b>Note:</b> This includes an associated non-habitable building being a private garage, carport, shed, structure or the like.</p>
<b>VETAB</b>	<p>means the New South Wales Vocational Education and Training Accreditation Board.</p>
<b>WorkCover NSW</b>	<p>means the WorkCover Authority of New South Wales established by section 14 of the <i>Workplace Injury Management and Workers Compensation Act 1998</i>.</p>

## CHAPTER 2 – CONSULTATION AND RISK MANAGEMENT

**The OHS Act and the OHS Regulation require employers to address workplace health and safety through a process of risk management and consultation.**

To effectively implement this code, employers need to be aware of these requirements and have procedures in place to apply them. Employers are advised to consult the OHS Act and the OHS Regulation as well as the *Code of Practice: Occupational Health and Safety Consultation*, and *Code of Practice: Risk Assessment* for details of these requirements and how they can be met. The following information is designed to provide an overview of legislative requirements.

The OHS Regulation requires employers (and self employed persons) to identify hazards and to ensure that any risk of injury from electricity at a place of work is eliminated, or if elimination is not reasonably practicable, that the risk is controlled.

Other legislative requirements particularly relevant to this code are clause 64 of the OHS regulation, which requires that electrical installations are inspected and tested prior to use and maintained to ensure they remain safe for use. Electrical articles used in construction work are regularly inspected, tested and maintained to ensure they remain safe for use and plant is not used in conditions likely to give rise to electrical hazards and risks. Electrical installations and electrical articles that are found to be unsafe are to be disconnected and repaired, replaced or permanently removed from service.

Controllers of premises also have obligations under section 10 of the OHS Act and clause 41 of the OHS Regulation.

This code of practice provides guidance on ensuring these requirements are met and should be implemented within a risk management framework. Risk management is a way of organising your efforts to determine safe systems of work. Following this procedure will help you identify the safety issues unique to your particular construction site.

The following information is designed to provide an overview of:

- consultation
- risk management
- planning and preparation
- supervision, training and instruction.

### 2.1 Consultation at the workplace

**Employers must consult with employees when taking steps to assess and control workplace risks.**

The information in this code of practice should be used when consulting with employees about the electrical hazards encountered in construction work.

### 2.1.1 Consultation arrangements

The OHS Act provides three options for consultation arrangements under sections 16 and 17:

Arrangement	Number of employees	Requirement
<b>OHS committee</b>	20 or more employees	<ul style="list-style-type: none"><li>• requested by a majority of employees, or</li><li>• directed by WorkCover</li></ul>
<b>OHS representative</b>	any size	<ul style="list-style-type: none"><li>• at least one employee requests an election, or</li><li>• directed by WorkCover</li></ul>
<b>Other agreed arrangements</b>	any size	agreed to by both the employer and employees (in a small workplace it may be a regular safety meeting with employees)

Before using this code, an employer should ensure that consultation arrangements are in place. An employer may initiate the establishment of an OHS committee or the election of an OHS representative if the employees have not made such a request. When the consultation arrangements have been decided, clause 27 of the OHS Regulation requires employers to record them and advise all existing and new employees.

### 2.1.2 Consultation procedures

After setting up the consultation arrangements employers need to consider when and how these consultation arrangements need to be applied.

### 2.1.3 When should consultation be undertaken?

Under section 13 of the OHS Act, employers have the general duty to consult employees when decisions are being considered that may affect their employees' health, safety and welfare. Therefore, employers are required to consult with their OHS committee, OHS representative or use another agreed arrangement when such decisions are being considered.

**Note:** Section 17(3) of the OHS Act provides that a Federal or State industrial organisation of employees may, on request, represent employees for the purposes of consultation on occupational health, safety and welfare under other agreed arrangements.

Decisions that could affect health, safety and welfare include:

- assessing, reviewing and monitoring risks to health and safety from work
- eliminating or controlling risks to health and safety arising from work
- determining or reviewing workplace amenities
- developing emergency procedures
- determining or reviewing consultation arrangements
- planning for new premises or modifying existing temporary construction wiring
- purchasing new plant or electrical equipment
- planning, designing or changing work tasks or jobs
- using contractors in the workplace
- investigating incidents or accidents, including electrical hazards

- regular inspection, testing and maintenance of electrical plant and equipment.

**Note:** Any procedures that are developed to encompass these activities should incorporate consultation.

It may not be practicable or reasonable to involve the OHS committee or the OHS representative in every decision or task change. However, the employers or committee or representatives should agree on what process is needed to ensure that affected employees are consulted.

#### 2.1.4 How should consultation be undertaken?

When engaged in consultation, section 14 of the OHS Act requires employers to:

- Share all relevant information with employees, for example, if an employer is going to change a work task, employees need to be told of any risk to health and safety that may arise and what will be done to eliminate or control these risks,
- Give employees reasonable time to express their views – employees need adequate time to assess the information given to them, obtain relevant safety information and consult with fellow employees to enable them to form their views,
- Value the views of employees and take them into account when the decision is made to resolve the matter – in many cases, agreement will be reached on how the safety issues are to be addressed. When agreement cannot be reached, the employer should explain how the employees' concerns have been addressed.

**Note:** For more details about the obligations to consult, refer to the *Code of Practice: Occupational Health and Safety Consultation*.

## 2.2 Risk Management: Establishing the special needs of your workplace

**Employers and self employed persons must identify any foreseeable hazards, assess their risks and take action to eliminate or control them. Employees must be consulted as part of this process.**

A hazard identification and risk assessment process must be carried out at the planning and preparation stage by the employer/contractor doing the work to determine what risks may arise when the work is being carried out. Safe systems of work must then be put in place to eliminate or control these risks.

**Note:** Clause 209 of the OHS Regulation requires safe work method statements where the cost of the work exceeds \$250,000 or for high risk construction work. High risk construction work is defined in clause 209 of the OHS Regulation and includes electrical work in or around an electrical installation at a construction site. This means that all electrical work carried out on an electrical installation at a construction site requires a safe work method statement.

These safety issues may also arise when organisations are considering purchasing equipment or substances, developing or changing work systems, and designing or re-modelling the workplace.

For further information, consult the OHS Act and OHS Regulation as well as the *Code of Practice: Occupational Health and Safety Consultation* and the *Code of Practice: Risk Assessment*.

The OHS Regulation requires employers to:

- identify the hazards
- assess the risk(s) to the health and safety of persons arising from the hazards
- use appropriate control measures to eliminate or control the risk
- monitor and review the control measures to ensure ongoing safety.

## 2.3 Planning and preparation

**The OHS Regulation (clause 8) requires that if more than one person has responsibility with respect to a particular OHS matter, each person retains responsibility for the matter, and that the responsibility is to be discharged in a coordinated manner.**

Consultation and coordination should occur before commencing work. To ensure coordination, before commencing work those involved should communicate with each other to determine safe systems for the work being carried out. Relevant parties may include the principal contractor, contractors, self employed persons, employers, electricians, electrical contractors, employees and their representatives.

Consultation and coordination should cover at least the following:

- nature of the work planned and ways of dealing with changes as construction proceeds
- the possible hazards and risks associated with the electrical power supply methods planned
- availability of electrical power supply, electrical plant and equipment
- interaction between trades at the site and their power requirements
- proximity of persons to electrical plant
- workplace access and egress (such as lighting)
- public safety (such as ensuring site security).

## 2.4 Supervision, training and instruction

**The OHS Act requires employers to provide such information, instruction, training and supervision as may be necessary to ensure the health, safety and welfare of their employees while at work.**

Training is one of the most important ways to ensure workers stay competent, productive and safe.

The OHS Regulation requires employers to ensure that employees receive certain specific types of training. For example, employers are required to provide OHS Induction Training for their employees. Principal contractors must not direct or allow any person to carry out construction work on the construction project unless the person has completed OHS Induction Training. OHS Induction Training includes:

- (a) general health and safety induction training
- (b) work activity based health and safety induction training
- (c) site specific health and safety induction training.

**Note:** Further guidance on 'OHS Induction Training' can be found in the *Code of Practice: Occupational health and safety induction training for construction work*.

Employers must also ensure that members of OHS committees and OHS representatives receive OHS Consultation Training. (**Note:** Further guidance on 'OHS Consultation Training' can be found in the *Code of Practice: Occupational Health and Safety Consultation*.) In addition to the above requirements, employers and principal contractors must ensure that licensed electricians and persons involved in electrical work on construction sites have relevant training.

All persons involved in any electrical work should be trained to apply systems of work and work practices that are safe and without risks to health. Only those persons who have received training and instruction should carry out the work.

The employer should monitor the systems of work and provide refresher training or ongoing training to ensure that safe systems and work practices are being followed.

The training and the instruction should be provided by a competent person (see definition) and should at least include:

- (a) hazard identification, risk assessment and risk control measures associated with electrical work, electrical plant and equipment
- (b) changes in OHS or electrical safety legislation including specific OHS obligations relating to electrical work, inspection and testing, electrical testing and fault finding, record keeping and mandatory electrical notifications
- (c) changes in WorkCover NSW codes of practice including this code, the *Code of Practice for low voltage electrical work* and the *Code of Practice: Work near overhead power lines*
- (d) changes in relevant Standards including AS/NZS 3012 and AS/NZS 3760 In-service safety inspection and testing of electrical equipment ('AS/NZS 3760').

# CHAPTER 3 – SWITCHBOARDS

## 3.1 General information

Switchboards installed for the purpose of supplying construction wiring and electrical equipment must comply with the following provisions:

- (a) Connected to incoming supply by a direct method, eg wired to terminals, and not by socket outlets or connecting devices
- (b) Robust construction with a minimum IP33 rating
- (c) Switchboard protective cover or lid is provided, and:
  - (i) fitted with a locking device for security purposes
  - (ii) attached in a way that will not damage cables or flexible extension cords connected to equipment on the switchboard
  - (iii) with means to retain the door in the open position when it is required to be kept open for the purpose of electrical work on the switchboard.
- (d) Isolating switch is provided that removes power from all outgoing circuits when it is in the open position. The isolating switch must be able to be locked or secured in the open position.

**Note:** Where outgoing circuits are associated with equipment, which is required to operate after hours an additional switch or switches should be used for the isolation of such circuits.

- (e) Lockable cover is provided over circuit-breakers and RCDs associated with outgoing circuits, but which does not prevent access to isolating switches.

**Notes:**

- 1. To avoid confusion as to which switches need to be located behind a lockable cover, do not use the RCD as the isolating switch.
  - 2. This cover requirement also applies to switchboards located in relocatable structures.
  - 3. The lockable cover must be manufactured from plastic or similar non-conductive material and be kept locked during normal hours of operation.
  - 4. Where the electrical installation comprises only one final sub-circuit the fitting of a lockable cover over the circuit-breaker and RCD is not necessary. Refer to Clause 3.6 of this code.
- (f) Incorporate means to support flexible extension cords and cord extension sets off the floor or ground. The support system must prevent mechanical damage to outgoing cables and relieve strain on cable terminations or plug and socket-outlet connections of flexible extension cords and cord extension sets.

**Note:** A typical means of achieving this is by providing an opening at the bottom of the enclosure and a support to keep cords off the floor or ground (eg tie bar, hanger, cross arm or stand) covered with a non-conductive material to which the cables can be anchored.
  - (g) Labeling or signage that includes:
    - (i) warning on escutcheon panel enclosing live parts – electric shock risk symbol and danger from live parts behind panels
    - (ii) identification of isolating switches including instructions if necessary to prevent inadvertent operation, for example:

**SECURITY LIGHTING AND SHEDS – DO NOT TURN OFF**

- (iii) a sign on the external surface of the door stating:

**KEEP CLOSED – RUN LEADS THROUGH BOTTOM**

- (iv) identification of the switchboard to distinguish from other switchboards on site.

- (v) an instruction on the lockable cover of RCDs and circuit-breakers:

**IN THE EVENT OF AN RCD OR CIRCUIT-BREAKER OPERATING, THE CAUSE OF ANY FAULT SHOULD BE ASSESSED BY A LICENSED ELECTRICIAN BEFORE RESET**

**Note:** On some construction sites a licensed electrician may not be present, in this case the cause of the RCD or circuit-breaker operation should be assessed by the equipment user by visually checking the equipment for any apparent damage before reset.

### **3.2 Mounting of switchboards**

Attach switchboards securely to a permanent wall, or a temporary structure that is secure and stable and that has been specifically designed for the purpose and meets the requirements of the local electricity network operator. Attach pole or post mounted switchboards securely with coach screws or bolts or fix with suitable clamps.

### **3.3 Location of switchboards**

In determining the location of switchboards, consideration must be given to changes to the site layout expected to take place throughout the construction process, eg erection of internal walls, in order that the switchboard remains in a convenient location to the users and damage to outgoing and incoming cables and flexible extension cords can be prevented.

In particular:

- (a) Do not locate switchboards outside the construction site perimeter.
- (b) Switchboards must be located in the proximity of the work area to ensure that longer flexible extension cords than those permitted in Table 1 are not necessary.
- (c) In multi level buildings, switchboards must be positioned in a manner that eliminates the need for cables and flexible extension cords connected to the switchboard to be run between floors.

**Note:** Exceptions to this provision include:

- cables and flexible extension cords run in stairwells or lift shafts for the supply of equipment used in that location, eg stairwell lighting, lift installation work
- cables and flexible extension cords run to external staging or formwork that spans more than one floor
- cables run to auxiliary socket-outlet panels in accordance with Clause 3.8
- cables run as construction wiring submains between switchboards.

### **3.4 Clearance in front of switchboards**

Switchboards should have at least 1 metre of clearance provided in front of the switchboard to allow clear unobstructed access.

### **3.5 Security of power circuits**

To prevent unauthorised access and the risk of electrocution or fire, the principal contractor or a nominated person should ensure that all power circuits are isolated and secured upon completion of the work shift, and/or when the site is unattended. The isolation requirement need not apply to circuits supplying security lighting and essential equipment, or to locked relocatable structures.

**Note: DO NOT LOCK SWITCHBOARDS DURING WORKING HOURS.**

### 3.6 Installations comprising one final sub-circuit

Where the electrical installation comprises only one final sub-circuit, or includes or incorporates a combined mains circuit breaker/residual current device (MCB/RCD) as the main switch, the fitting of a lockable cover for circuit breakers and RCDs is not necessary.

### 3.7 Auxiliary socket-outlet panel

In building construction, switchboards must be positioned in a manner that eliminates the need for flexible extension cords to be run between floors or across large open plan floor areas. To facilitate this requirement in some workplace situations (eg mezzanine levels, sub floor apartment construction, large open-plan floor areas) the use of a suitable socket outlet panel is permitted.

The use of this socket-outlet panel commonly referred to as a 'auxiliary board or satellite board' facilitates improved safety as it limits the location of flexible extension cords to the immediate work area, thereby eliminating the need to use long flexible extension cords run from a main switchboard or distribution board that may be located on a different floor level or some distance away from the immediate work area where electrical power is required.

**Note:** On multi-storey construction sites an auxiliary socket-outlet panel is not to be used as a substitute for a distribution board required on another floor level of the building under construction. The outlet device should be confined to the main structural level or mezzanine level where the work is carried out. Refer Illustration 1 for an example of the installation of auxiliary socket-outlet panels on a multi storey construction site.

In the situations outlined above, the use of an auxiliary socket-outlet panel is allowed subject to the following construction and installation conditions being met:

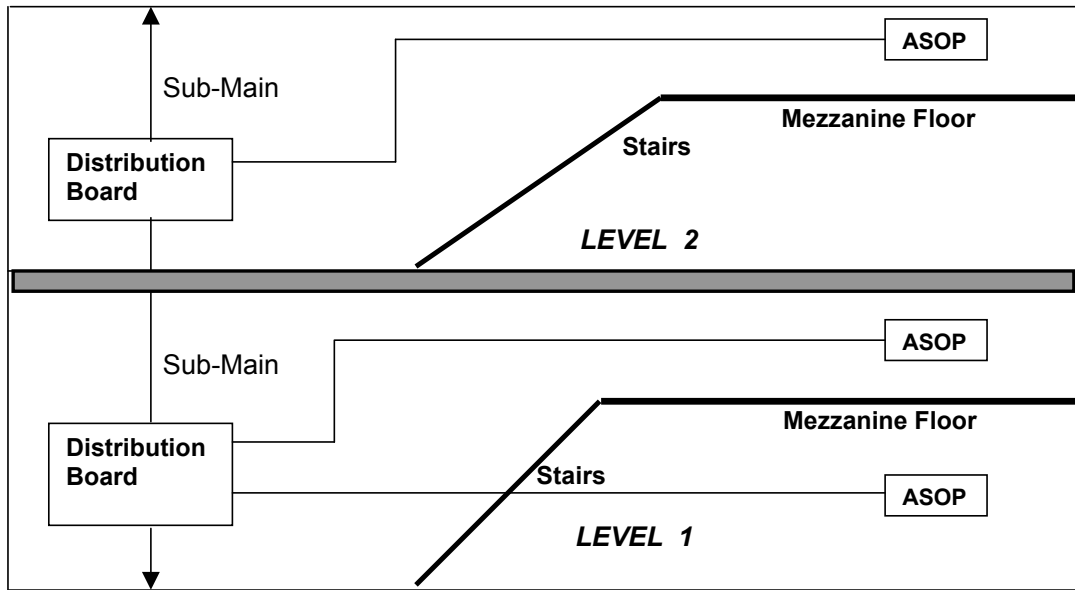
- (a) supplied by a dedicated final sub-circuit that is hard wired and protected by a 30mA RCD and a circuit breaker located in the main switchboard or distribution switchboard and be labelled to indicate the source of supply
- (b) wiring supplying the outlet device is to have active, neutral, and earth conductors of a minimum of  $4.0\text{mm}^2$  cross sectional area
- (c) wiring is to be protected from mechanical damage and clearly identified as construction wiring
- (d) the outlet device must be of robust construction and the socket outlets mounted on the device be protected against the risk of mechanical damage by extended sides or covers
- (e) the outlet device must be fitted with double pole switches on every 230 volt socket outlet
- (f) include a means to prevent strain on termination of flexible extension cords such as a tie bar or other means, which must be covered with material that is non-conducting and will prevent mechanical damage.

**Note:** A typical means of achieving this is by providing a support (eg tie bar, hanger, cross arm or stand) covered with a non-conductive material to which the flexible extension cords can be anchored.

- (g) be located at a height of between 1.2 – 2 metres above the floor and mounted securely to a permanent structure or a temporary structure that is secure and stable and that has been specifically designed for the purpose
- (h) the outlet device must have a minimum IP 33 rating.

**Illustration 1**

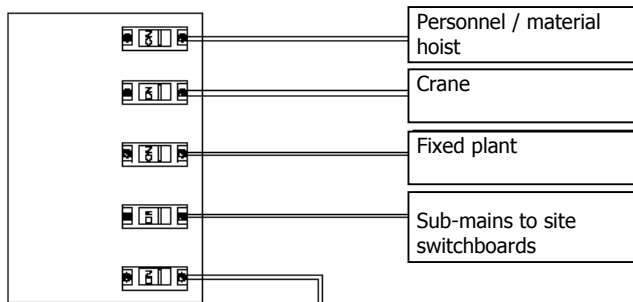
Elevation of multi-storey building under construction showing location of Auxiliary socket-outlet panels (ASOP)



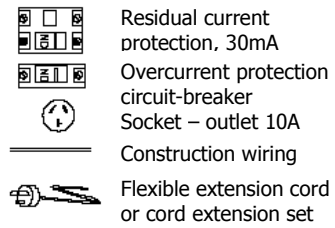
## Illustration 2

### Guide to arrangement of switchboards, construction wiring and equipment

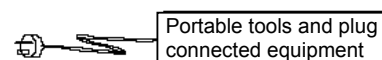
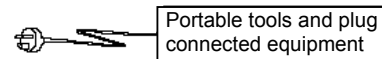
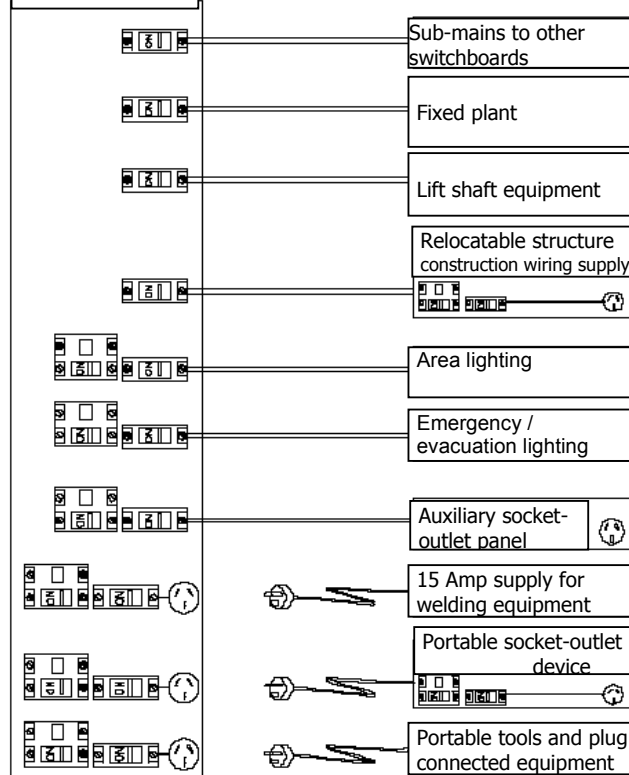
#### MAIN SWITCHBOARD



#### LEGEND



#### ISOLATING SWITCH



#### SITE SWITCHBOARD

# CHAPTER 4 – ELECTRICAL WIRING AND EQUIPMENT

## 4.1 RCD protection of final sub-circuits

(a) Every single phase and three phase final sub-circuit must be protected by a 30mA RCD, which operate in all live (active and neutral) conductors. This includes construction lighting, socket outlets supplying hand held or portable equipment and relocatable structures. The RCD must be located at the switchboard where the final sub-circuit originates.

This requirement need not apply to final sub-circuits supplying equipment where safe mechanical operation is at risk, such as for cranes, hoists or personnel lifts.

(b) Where construction work supply can only be obtained from permanent wiring, the electrical equipment must be protected by an RCD located in accordance with one of the following:

- (i) at the switchboard at the origin of the final sub-circuit supplying electrical equipment
- (ii) incorporated into the socket-outlet supplying the electrical equipment
- (iii) incorporated into a portable socket outlet assembly arranged for connection to a socket outlet either directly or by means of a flexible extension cord of maximum length 2m and a plug.

**Note:** This provision allows for minor construction work to be carried out using existing permanent socket outlets at the place of work. When work of longer duration or size is carried out, arrangements should be made to have separate temporary construction wiring installed that conforms to the requirements of this code.

## 4.2 Over-current protection

(a) Protect all sub-mains with circuit breakers, or HRC (high rupturing capacity) fuses. Circuit breakers on sub-mains must be able to be locked or secured in the 'open' position and tagged.

(b) Every final sub-circuit must be protected by a fixed over-current circuit breaker that is labelled by a licensed electrician to identify the outlets or equipment they supply.

## 4.3 Cable installation

Cables must be installed in accordance with AS/NZS 3000 – Wiring Rules except as varied in Clauses 4.4 to 4.11.

## 4.4 Clear identification of construction wiring

Construction wiring sub-mains and sub-circuits must be readily distinguishable from permanent installation wiring by using cable of a different colour, or by attaching iridescent yellow tape printed with the words 'Construction Wiring'. Tape markers must be spaced at intervals to ensure that at least one tag is clearly visible from wherever the cable can be seen. Such intervals must not exceed 5 metres.

## 4.5 Separation of construction wiring from permanent wiring

Construction wiring must not be tied to, bundled, or grouped with permanent installation wiring.

#### 4.6 Mechanical protection of construction wiring

As construction sites are harsh working environments, a risk assessment should be undertaken, prior to the installation of cabling or whenever a change occurs, as to the likelihood of the cabling being exposed to mechanical damage. Where the risk assessment identifies a risk of damage to cabling, and the cabling cannot be relocated to an alternative position, it must be protected by a suitable enclosure or barrier not less effective than:

- (a) medium duty rigid PVC conduit
- (b) heavy duty corrugated conduit
- (c) flexible electrical hose.

The following are some examples of situations where cabling would require mechanical protection:

- cabling run within 2.5 metres of the floor or ground level
- cabling run on exterior surfaces that may be subject to mechanical damage
- cabling supplying switchboards and final sub-circuits located on formwork decks
- cabling run on perimeter construction fencing permanently secured in the ground.

**Note:** Cabling should not be attached to relocatable type 'port-a-fencing' unless the fencing is permanently secured to the ground

- cabling slung under a concrete ceiling slab more than 150mm away from the juncture of the ceiling slab and a wall or beam which would otherwise provide protection
- cabling which may come into contact with unearthed metal structures being installed as part of the construction process, (ie sheet metal ducts, hydraulic piping, scaffolding, etc).
- cabling run across the top of relocatable structures, storage containers, shipping containers or the like
- cabling run across or over metallic roofs or edges
- cabling run in hostile environments such as a trench filled with debris and /or water
- cabling running across a metal grid ceiling.

#### 4.7 Height clearance for flexible extension cords

Flexible extension cords should be run on hangers or stands to provide a safe route through the work area and passageways and to provide sufficient height clearance for personnel and vehicles. Clearances of at least 2 metres should be maintained in work areas where personnel work. Greater clearances must apply in areas where motor vehicles operate. This need not apply within a horizontal distance of 4 metres from the immediate work area where the power is to be used.

In the case of a single unit dwelling house site a risk assessment should be undertaken to determine the likelihood of the cabling being damaged. Where the risk assessment identifies a risk of damage to cabling, it should be run on hangers or stands to provide a safe route through the work area and passageways and to provide sufficient height clearance.

#### 4.8 Socket outlets and double pole switches

- (a) Ensure that every 230 volt socket outlet is rated at 10 amperes minimum. Double pole switches must be used on every 230 volt socket outlet on equipment that is supplied by means of a plug and socket, and on relocatable structures.

**Note:** Socket outlets may be either the type with a manual switch or the shutter type, which switch on when the plug top is inserted and switch off when it is removed.

- (b) Use socket outlets within relocatable structures only to supply power to plant and lighting within or immediately adjacent to the relocatable structures. Protect these outlets with an RCD. Do not use them to supply power to any other part of the building, structure or construction work site.

#### 4.9 Portable socket outlet assemblies

Double adaptors, three pin plug ('piggy back') adaptors, domestic type power boards and similar fittings are not permitted for construction work and must not be used.

Portable socket-outlet assemblies (PSOAs), being a plug in device commonly known as a 'power board' that provides one or more socket-outlets, may be used for the connection of plug in construction equipment subject to the following conditions:

- (a) robust double insulated construction and a minimum rating of IP 33
- (b) socket-outlets mounted on the assembly are protected against damage by extended sides or covers
- (c) incorporates over current protection device with a maximum current rating of the supply flexible extension cord
- (d) incorporates RCD protection with a maximum residual or tripping current of 30mA

**Note:** The RCD may be fitted at the plug attached to the supply flexible extension cord.

- (e) fitted with a heavy duty sheath type flexible extension cord having a maximum length of 2.0 m and a three pin plug
- (f) the use of a cord extension set (extension lead) is allowed when using a PSOA provided the extension lead is plugged into a socket outlet that is protected by a 30mA RCD at the power source. If the socket outlet is not protected by a 30mA RCD an extension lead cannot be used in this configuration and the PSOA must be plugged directly into the socket outlet.

#### 4.10 Unused electrical cables

Unused electrical cables should be removed or appropriately terminated by a licensed electrician.

#### 4.11 Aerial conductors

- (a) Cables supported by means of a catenary must be stranded or flexible cables affording double insulation or the equivalent of double insulation.

**Note:** Local regulations may prohibit cables supported on catenary in bushfire prone areas. In this case the principal contractor should consult with the local electricity network operator.

- (b) 'Tiger tails' are commonly used in conjunction with overhead wires including aerial catenary. They may be used to provide a useful visual indication to crane and mobile plant operators and other persons working in the area of energised low voltage overhead power lines.

## WARNING



Tiger tails do not provide protection from electrical hazards against contact by cranes, mobile plant, tools or materials. They should not be regarded as providing protection from electrical hazards and they do not protect people from the risk of electrocution or electric shock.

Tiger tails must only be fitted to the overhead power lines by an electrically qualified person who is authorised by the local electricity network operator.

A competent person should visually inspect tiger tails at the worksite on a regular basis and prior to commencing crane, scaffolding or mobile plant operations. If the tiger tails have moved or been damaged, the local electricity network operator must be contacted to ensure the tiger tails are replaced or located in the correct position.

**Note:** Work near overhead power lines must not proceed until the tiger tails have been replaced or located in the correct position by the electricity network operator.

### 4.12 Flexible cords and cord extension sets (extension leads)

#### 4.12.1 General provisions

The following conditions apply to the construction of single phase and three phase flexible cords and cord extension sets:

- Single phase three pin plugs and cord extension sockets used on flexible cords and cord extension sets and power tools must be either a non-rewirable (moulded) type or a transparent type.
- Ensure that plugs and cord extension sockets are wired identically and that the identity of actives, neutral and earth connections are preserved in a like manner.
- Three-pin plug adaptors ('piggy back' plugs) are not permitted.
- Cord extension sets must be heavy duty sheath flexible cords. The types of cables normally used as installation wiring must not be used as flexible cords or cord extension sets.
- The sheath of a flexible cord or cord extension set must not contain the colour green. This is to avoid potential confusion with individual earthing conductors.
- The current rating of the flexible cord or cord extension set must not be less than the connected load.
- The maximum length of a single phase cord extension set is shown in Table 1.

**Table 1 – Maximum length of single phase cord extension set**

Current rating (A)	Conductor size (mm <sup>2</sup> )	Maximum length (metres)
10	1.0	25
	1.5	35
15/16	1.5	25
	2.5	40
20	2.5	30
	4.0	50

**Note:** Lengths quoted for flexible cords are taken from AS/NZS 3199 and are based on a voltage drop of 5% of 230V at rated current for the conductor size.

- (h) **Two cord extension sets** can be joined together provided that the total length of any such combination does not exceed the maximum length for the cord size and ratings specified in Table 1. Refer clause 4.12.2 (d) for specific installation requirements.
- (i) The attachment of flexible cords associated with electrical equipment, must not extend the cord extension sets of the maximum length by more than 5 metres.

#### **4.12.2 Installation**

The following conditions apply to the installation of single phase and three phase flexible cords and cord extension sets:

- (a) Flexible cords and cord extension sets used in multi-storey construction must be confined to the same floor as the switchboard from which they originate. This clause need not apply to:
  - stairwells or lift shafts for the supply of equipment used in that location, eg stairwell lighting, lift installation work
  - external staging or formwork that spans more than one floor
  - single unit dwelling sites provided that the risk of damage to cabling is identified and avoided by use of hangers or stands to provide a safe route through the work area and passageways.
- (b) Flexible cords and cord extension sets must be run on hangers or stands to provide sufficient height clearance in work areas, passageways and areas in which vehicles may travel. Unless other precautions are taken, the minimum clearances must be 2m in areas where personnel work. Greater clearances must apply in areas where motor vehicles operate.

#### **Notes:**

- 1. This height condition need not apply within a horizontal distance of 4 metres from the immediate work area where the equipment is being used.
  - 2. The requirement to suspend flexible cords and cord extension sets may not be practicable on construction sites, which are on open ground. In this case other precautions must be taken to prevent damage to the cables that may be caused by the construction work activity.
- (c) Where flexible cords and cord extension sets pass through scaffolding or other metal structures, they must be run on hangers covered with non-conducting material to prevent mechanical damage.
  - (d) Where flexible cords and cord extension sets are linked together and used outdoors or in situations such as metal roofs or decks or where water may be present, the extension socket and plug should be protected by design or enclosure against separation of the plug and socket or the ingress of water.

**Note:** There are proprietary manufactured weatherproof screw type coupling accessories designed for this purpose.

## CHAPTER 5 – INSPECTION AND TESTING

The OHS Regulation (clause 64) requires the employer to ensure the electrical installation and electrical articles are regularly inspected, tested and maintained by a competent person to ensure they are safe.

### 5.1 Who can perform inspection and testing?

For the purposes of this chapter this means the following class of person:

- a licensed electrician, this class of person can carry out all of the inspection and testing activities described in this chapter, or
- a trained competent person not qualified in electrical work, but who has obtained competency to carry out inspection and testing of portable plug in electrical equipment using a portable appliance tester (PAT). This class of person is **restricted** to only carry out 'testing and tagging' activities as described in specific clauses of this chapter.

#### 5.1.1 Training and competence – Competent person

- (a) A trained competent person who carries out the inspection and testing of portable plug in electrical equipment should have successfully completed a VETAB approved training course or equivalent State regulator's approved training course that has been conducted by a registered training organisation (RTO). For example the NSW Department of Technical and Further Education's Course – *Safety Testing Electrical Appliances – 6033*.

**Note:** 'Successful completion' means the trainee has been confirmed by the RTO as competent following completion of a competency assessment.

- (b) The RTO who provides the training and competency assessment required by this code must ensure that the person is competent and provide the person concerned with a statement of attainment or written certification of his/her successful completion of assessment, that has an identifying number particular to that person.
- (c) A competent person trained in the use of a PAT must produce their statement of attainment or certificate on request to an employer, principal contractor, inspector, contractor, elected OHS representative or authorised representative.

**Note:** For further guidance on the competencies of this class of person refer to the *WorkCover Guide – Competent Person for Testing and Tagging Electrical Equipment*.

### 5.2 Safety and compliance testing of construction wiring by a licensed electrician

- (a) All construction wiring, including switchboards and wiring to relocatable structures, must be inspected and tested by a licensed electrician after completion of the electrical wiring work and before connection for normal use. In addition to visual inspections, testing must be for earth continuity, insulation resistance, polarity, residual current devices and correct circuit connections, and must be performed in accordance with AS/NZS 3000 – Wiring Rules. Guidance relating to testing methods may be found in AS/NZS 3017: Electrical installations – Testing and inspection guidelines.
- (b) Notify the results of the safety and compliance tests and issue a *Certificate of Compliance – Electrical Work* to the owner or principal contractor in charge of the electrical installation and, if required by the *Electricity (Consumer Safety) Regulation, 2006* the local electricity network operator. Copies of *Certificates of Compliance – Electrical Work* should be kept on site by the principal contractor and made available for review by inspectors, electricity network operators, OHS representatives or authorised officers.

For example, notification is required where the physical location of a switchboard or associated electrical equipment is altered at a construction site.

**Note:** Notification is not required for disconnection, reconnection, replacement or repair activities provided the electrical wiring work does not alter the electrical loading, method of electrical protection, system of earthing or physical location of fixed switchboard/s or associated electrical equipment being repaired or replaced.

- (c) Following initial testing, re-inspection of the construction wiring, including switchboards and wiring to relocatable structures must be carried out by a licensed electrician at 6 monthly intervals. If the re-inspection process discloses an apparent fault or non-conformance the relevant section of the construction wiring must be re-tested following repair or replacement.
- (d) The electrical installation, (including the construction wiring, switchboards and wiring to relocatable structures) must be maintained by a licensed electrician to ensure it remains safe for use.
- (e) Records of inspections, tests and maintenance must be made and kept in accordance with the requirements of clause 5.6 (a) and (b)

### **5.3 Testing of plant, portable plug-in electrical equipment**

- (a) All electrical plant including portable plug-in electrical equipment and flexible extension cords must be visually inspected regularly for wear and mechanical damage, and tested in accordance with AS/NZS 3760 for earth continuity and insulation resistance or leakage current.
- (b) Inspection and testing of electrical plant, portable plug-in electrical equipment and flexible extension cords must be undertaken by a licensed electrician or a trained competent person, (refer to Clause 5.1) in accordance with the following testing intervals:
  - (i) prior to its introduction to service on a construction site
  - (ii) at regular three monthly intervals for single unit dwelling house sites
  - (iii) at regular monthly intervals for all other construction work, except if an electrical equipment risk assessment report determines that inspection and testing shall be carried out by a licensed electrician at regular three monthly intervals. Refer to Clause 5.3.1 below.

Tested plant, portable plug-in electrical equipment and flexible extension cords must be tagged and all test results recorded in accordance with the requirements of clause 5.6 (a) and (b)

#### **5.3.1 Electrical risk assessment report**

- (a) An electrical risk assessment report means a risk assessment that is undertaken at a construction site relating to the use of electrical plant, portable plug-in electrical equipment and flexible extension cords at that site that determines the inspection and testing frequency of that electrical equipment.
- (b) Electrical plant including portable plug-in electrical equipment and flexible extension cords that is subject to an electrical risk assessment report that alters the testing frequency to a 3 month testing interval shall be inspected and tested by a licensed electrician.
- (c) Any such risk assessment must be prepared in accordance with the consultation requirements outlined in Chapter 2 of the Code and include the following persons:
  - (i) a representative of the employer or principal contractor
  - (ii) licensed electrician nominated by the employer or principal contractor in charge of the construction work

- (iii) OHS committee representative or OHS representative or other agreed employee representative (refer to clause 2.1.1)
- (iv) site safety employee representative/s.

### **5.3.2 Assessment results and outcome**

- (a) The following information must be recorded on the electrical risk assessment report:
  - (i) the name of the person who carried out the risk assessment
  - (ii) the name or names of the person or persons consulted prior to the risk assessment being carried out
  - (iii) the location and address of the construction site
  - (iv) the date on which, or dates over which the risk assessment was carried out
  - (v) the result or outcome of the risk assessment
  - (vi) a determination as to the requirement to regularly inspect and test portable electrical equipment and flexible electrical cords every three months
  - (vii) approval by the employer or principal contractor.

An example of an electrical risk assessment report is provided at Appendix 1 to assist in undertaking and recording the results and outcome of the risk assessment.

## **5.4 Testing of electrical equipment in amenities sheds and site offices**

All electrical equipment in amenities sheds and site offices should be inspected, tested and tagged upon arrival or relocation on site and then at least three monthly intervals thereafter by a licensed electrician or a trained competent person (refer to Clause 5.1).

At the date of the inspection use a tag as specified in clause 5.7. The tag will be valid for at least three months. Details of inspections and tests are to be recorded in accordance with Clause 5.6 and kept on site or at the owner's premises.

## **5.5 Testing of hired electrical plant and electrical appliances**

All electrical plant and electrical appliances hired for construction work must be inspected, tested and re-tagged (when due) and recorded at the hirer's premises prior to hire in accordance with the requirements of AS/NZS 3760. It is then the responsibility of the hiree to meet the conditions of Clauses 5.3, 5.6 and 5.7.

**The OHS Regulation (clause 65) requires the employer to keep records of all inspections, tests and maintenance carried out on the electrical installation and electrical equipment.**

## **5.6 Record keeping and production of records**

- (a) Records of inspections, tests and maintenance carried out on the electrical installation and electrical plant/equipment must be kept by the employer. A copy of records should also be kept on site by the principal contractor.

- (b) Records of inspections, tests (including *Certificates of Compliance – Electrical Work*) and maintenance and if applicable electrical risk assessment reports must be produced to an Inspector, principal contractor, electricity network operator, elected OHS representative or authorised representative within 24 hours of a request being made.
- (c) Ensure that details in the inspection and testing record specified in Clause 5.3 and 5.4 are legible and must show:
  - (i) the date of the inspection
  - (ii) the plant number or inspection number of the item inspected
  - (iii) the results of the tests and inspections
  - (iv) details of any repair/maintenance work required as a result of the inspection
  - (v) the licence/certificate number, printed name and signature of the licensed electrician or trained competent person who carried out the inspections and tests.

## 5.7 Tags

Ensure that the tags specified in clause 5.3 and 5.4 are legible and must show:

- (a) the date of the inspection
- (b) the plant number or inspection number of the item inspected
- (c) the licence/certificate number, printed name of the licensed electrician or trained competent person who carried out the test and filled in the tag.

Ensure that all tags:

- (i) are durable and water resistant
- (ii) are non metallic
- (iii) are self-adhesive or positively secured
- (iv) are incapable of re-use
- (v) have a bright, distinctive surface.

The tag may be colour coded to identify the month in which the inspection and testing was performed.

If colour coded tags are used a recommended colour coding schedule is as follows:

January – Red	May – White	September – Red
February – Blue	June – Yellow	October – Yellow
March – Orange	July – Blue	November – Orange
April – Green	August – Green	December – White

## 5.8 RCD testing

- (a) Ensure that every portable RCD is tested by the user before each use on a daily basis by operation of the pushbutton.
- (b) Ensure that every portable RCD is subject to an operating time at tripping current test using an RCD tester that is carried out by a licensed electrician every 3 months.
- (c) Ensure that every fixed RCD is tested by a licensed electrician or nominated person every month by operation of the pushbutton.

- (d) Ensure that every fixed RCD is subject to an operating time at tripping current test using an RCD tester that is carried out by a licensed electrician every three months from the time of installation.
- (e) Record the results of the operating time tests in accordance with clause 5.6, listing:
- (i) the plant number or identifying number of the RCD
  - (ii) the result of the test
  - (iii) the date of the test
  - (iv) the licence number, printed name and signature of the licensed electrician who performed the inspections and tests.

<b>Table 2 – Inspection and testing intervals</b>	
<b>Equipment class</b>	<b>Testing intervals</b>
Construction wiring including, switchboards	Inspected and tested at time of installation, then re- inspected every 6 months.
Relocatable structures, fixed and transportable equipment	6 months
Portable plug-in equipment and flexible electrical cords	3 months: single unit dwelling house sites 1 month: construction sites <b>or</b> 3 months following completion of an electrical risk assessment report #
Equipment in amenities and site offices	3 months
Portable RCDs – pushbutton test	Before each use of equipment
Portable RCDs – operating time	3 months
Fixed RCDs – pushbutton test	1 month
Fixed RCDs – operating time	3 months
Hire equipment	Upon introduction to service then in accordance with the testing intervals appropriate to the equipment class.

# Following completion of an electrical risk assessment report in accordance with the requirements of clauses 5.3.1 and 5.3.2.

## CHAPTER 6 – PORTABLE GENERATORS

### 6.1 Provision of electrical supply

Temporary electrical supply for construction work should as far as reasonably practicable be obtained from the electrical distribution network and connected in accordance with the requirements of this code.

If this source of electrical supply is not reasonably practicable, electrical supply can then be obtained from alternative means such as portable generators.

**Note:** The use of portable generators should be limited to work of a short duration or one-off applications.

Before using portable generators a range of associated hazards and factors should be considered including, manual handling, fuel usage and storage, engine exhaust emissions, confined spaces, noise and vibration, weather protection, radio and telecommunications interference.

Electricity supplied from portable generators must conform to the following requirements:

### 6.2 Portable generators – Construction

Portable generators must comply with AS 2790, 1989 as amended Electricity Generating Sets – Transportable (up to 25 KW); and be connected to construction wiring installation or equipment in accordance with AS/NZS 3010:2005, Electrical installations – Generating sets ('AS/NZS 3010') and AS/NZS3012 depending on the type of generator.

The following arrangements are permitted for single-phase generators:

- (a) a generator connected to a site switchboard, which is fitted with socket-outlets and RCD protection. In this case the generator must be installed by an electrical contractor in accordance with the requirements of AS/NZS 3000 – Wiring Rules and AS/NZS 3010 and be inspected and tested by a licensed electrician prior to being introduced to service and after relocation. Refer Figure 1.
- (b) a generator of isolated winding type with integral socket-outlets controlled by double-pole switches to which portable **double-insulated** equipment can be connected. Refer Figure 2.
- (c) a generator with integral 30mA RCD and socket-outlets to which portable equipment can be connected. Refer Figure 3.

### 6.3 Portable generators – Earthing and bonding

Portable generators constructed in accordance with the principles of AS 2790 have insulated windings and frame equipotential bonding facilities that are intended for connection in one of the following manners:

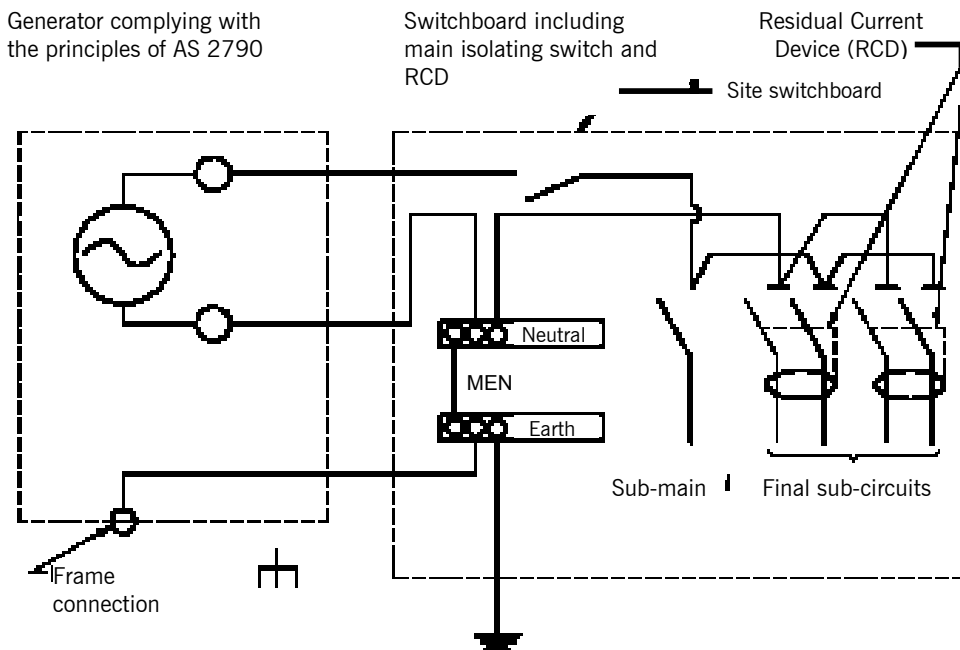
- (a) Where a generator is connected to a switchboard, the frame is earthed by connection of an earthing conductor, normally incorporated with supply conductors, to the earth bar of the installation.
- (b) Where a generator supplies portable equipment from integral socket-outlets, an equipotential bonding system is created by connection of the frame to the earth pin of the socket-outlets and the exposed conductive parts of any equipment plugged into the outlets.

**Note:** Where the generator has an integral RCD, a connection is also made between the frame and one side of the generator winding to enable the RCD to operate in the event of a fault.

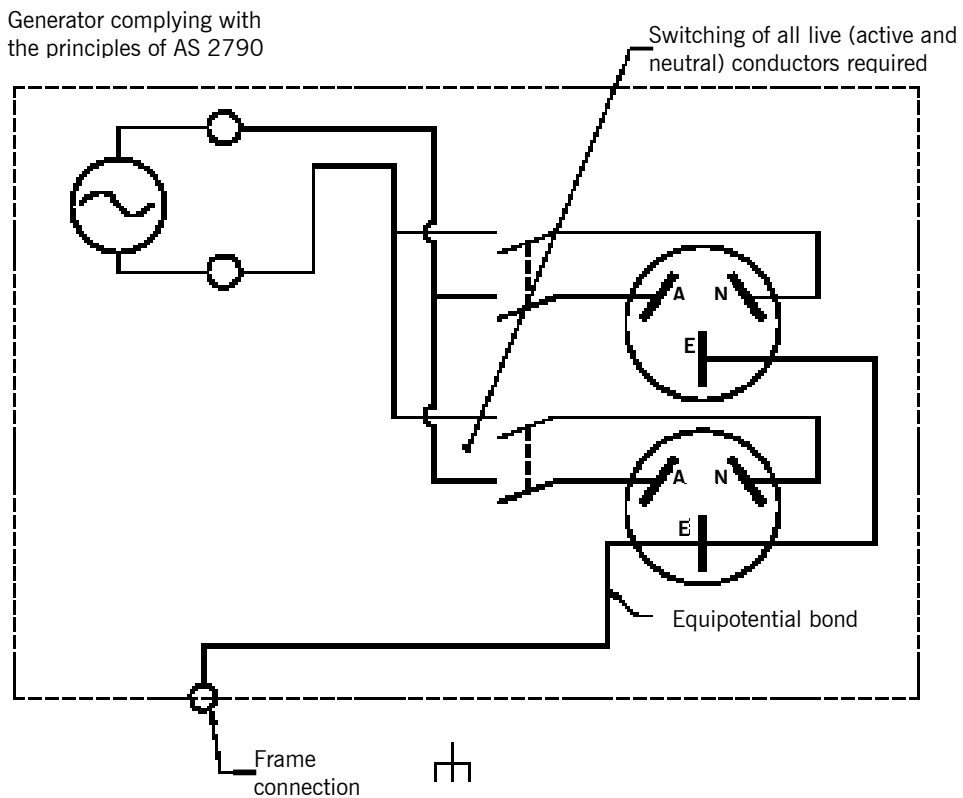
## 6.4 Earthing of portable generators

No additional earth conductors or earth electrodes (earth stakes) are required or recommended other than those shown in Figures 1, 2 or 3.

**Figure 1: Low voltage connection from stand alone single phase generator to site switchboard**

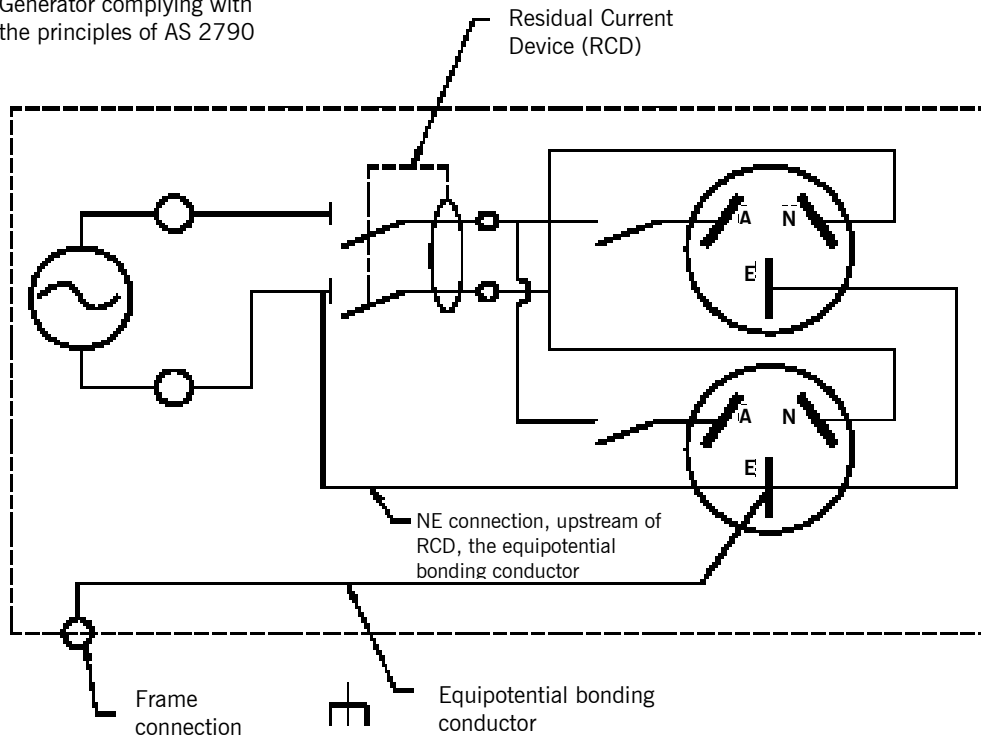


**Figure 2: Isolated winding generator with integral socket outlets**



**Figure 3: Generator with integral RCD protected socket outlets**

Generator complying with the principles of AS 2790



**Note:** Where the generator has an integral RCD, a connection is also made between the frame and one side of the generator winding to enable the RCD to operate in the event of a fault.

# CHAPTER 7 – LIFT SHAFTS

## 7.1 Supply arrangement

Equipment and lighting used in the construction phase of lift and service shafts must be supplied by separate final subcircuits of construction wiring that are:

- (a) protected by a 30 mA RCD
- (b) used only for lift and service shaft work
- (c) identified, locked or secured and tagged at the circuit-breaker to prevent accidental isolation of the supply to the lift shaft by other persons on site.

**Note:** The sub-board supplying the lift and service shafts should be placed as close as practicable to the lift or service shaft opening to reduce the possibility of interference.

## 7.2 Lift shaft lighting

Lift shaft lighting may be supplied from either construction wiring or permanent installation wiring. Where installed as part of the permanent lift installation, the lighting must comply with relevant requirements of AS 1735 and the lift equipment designer's instructions.

Light fittings should be:

- (a) a minimum of 36 watt fluorescent lamps suitably guarded against mechanical damage
- (b) connected to the supply wiring by means of a plug and socket
- (c) installed at intervals not exceeding 9 metres with the uppermost fixture within 1 metre of the top of the shaft
- (d) controlled by switches located within easy reach of the lift well access points at the top and bottom floor levels.

Where multiple lift shafts are being constructed for the purpose of installing more than one lift in an adjacent shaft, one lift shaft may be provided with effective illumination from a vertical riser of luminaries in an adjacent shaft.

## 7.3 Emergency lighting

Emergency lighting must be provided to allow safe egress from any active work area within the lift shaft upon loss of normal lighting. Emergency lighting must be provided for a minimum duration of one hour after the loss of normal lighting and must be capable of providing visual conditions that will permit the safe evacuation of workers from the lift shaft. Refer to relevant requirements of AS/NZS 2293.1 – Emergency evacuation lighting buildings – System design, installation and operation.

## 7.4 False cars

Where false cars are installed for the purpose of the installation of lift well equipment, construction wiring for electrical supply to the false car should conform to the following:

- (a) It should have a minimum 230 volt supply with a 20A socket outlet sourced from a separate final sub-circuit, which is protected by a 30mA residual current device. The sole purpose of this supply should be for the provision of adequate power to the climbing hoist including task lighting and power for the use of electrical tools when working from the false car working platform.

(b) The electrical wiring to the false car working platform should be from heavy duty double insulated flexible extension cord rated or cable with a minimum conductor size of 4.0mm<sup>2</sup>.

(c) The flexible cord should be:

- secured at the top of the shaft and at the point of attachment to the false car by a suitable means to prevent mechanical damage
- suspended in the lift shaft in a manner that will ensure adequate running clearance between the false car and the lift shaft, preventing fouling or mechanical damage to the cord
- of sufficient length to allow for free travel of the false car through the entire length of the lift shaft.

# CHAPTER 8 – LIGHTING

## 8.1 General provisions

Install adequate artificial lighting to illuminate the work area if there is insufficient natural lighting.

- (a) Fixed light fittings must be installed in accordance with the requirements of this code and be connected to a lighting circuit by a direct method eg wired to terminals, and not by socket outlets or connecting devices.
- (b) Portable light fittings used for task lighting must comply with the following provisions:
  - for indoor dry areas a minimum rating of IP 2X and for wet areas a minimum rating of IP 24
  - be fitted with a mechanical guard for the lamp
  - be of adequate stability.

## 8.2 Protection of light fittings

To prevent mechanical damage to lamps, light fittings must be fitted with devices such as wire guards or proprietary manufactured diffusers. Light fittings installed as part of the permanent electrical installation or in low risk areas such as site accommodation need no further mechanical protection.

**Note:** Lamp holders require mechanical protection.

## 8.3 Emergency/evacuation lighting

Where there is insufficient or inadequate natural light, adequate emergency lighting should be provided. Refer to AS/NZS 2293.1 for details.

Where work or amenities areas do not have natural daylight, sufficient maintained battery powered evacuation lighting must be installed to allow safe exit from those areas in the event of an emergency. Refer to AS/NZS 2293.1 and AS 1680.0 Interior Lighting Part 0: Safe Movement.

Battery powered evacuation lighting, including exit signs, must operate for a minimum of one hour following loss of supply. Evacuation lighting should be subjected to a discharge test every 6 months and results recorded and kept on site or made available for inspection.

## 8.4 Exit lights

Exit lights must not be positioned any more than 1 metre directly above an exit, or any more than two metres directly in front of the exit.

Exit directional arrows are required to be positioned in hallways, which do not lead directly to an emergency exit.

## 8.5 Festoon lighting

Use of festoon lighting is restricted to underground shafts, wells and tunnels and is subject, to the following:

- lamp holders must be of the moulded, non-removable type and be provided with a non-conductive, mechanical guard for the lamp
- supply voltage must be at extra low voltage (50 volts a.c.).

## CHAPTER 9 – MISCELLANEOUS PROVISIONS

### 9.1 Supply to relocatable structures (Site sheds)

Ensure that supply to electrical installations and electrical equipment in relocatable structures are inspected and tested by a licensed electrician and comply with the following requirements:

- (a) if supply is by means of a flexible cable, do not take it from one relocatable structure to another relocatable structure, or to another inlet on the same structure
- (b) connect each relocatable structure by a dedicated final sub-circuit that is hard wired and protected by a 30mA RCD and a circuit breaker located in the main switchboard or distribution switchboard
- (c) protect flexible cables from mechanical damage in accordance with the requirements of clause 4.6
- (d) power outlets in relocatable structures should be used to supply power to electrical equipment and lighting with the structure
- (e) socket-outlets installed on the outside of relocatable structures must be used only to supply power to electrical equipment and lighting immediately adjacent to those structures.

**Note:** For further guidance on supply to relocatable structures refer to AS/NZS 3012.

### 9.2 Evacuation system

Where an evacuation system including sirens is installed, battery back-up should be provided.

### 9.3 Personnel and material hoists

Personnel and material hoists used on construction sites must comply with the following provisions:

- (a) supply construction wiring for hoists from a separate final sub circuit originating from the main switchboard
- (b) suitably identify this supply as being for the operation of the hoist or hoists.

# APPENDIX 1 – EXAMPLE ELECTRICAL RISK ASSESSMENT REPORT

## Overview

This sample electrical risk assessment report is designed to help the employer or principal contractor make a determination as to the requirement to regularly inspect and test portable plug-in electrical equipment and flexible extension cords every three months in accordance with the requirements of clause 5.3 of this code.

## Completing the risk assessment

When completing the electrical risk assessment report, you should, in addition to the required control measures listed in Section 3 of this report identify any specific workplace factors that may contribute to the risk, including:

- the work premises and the working environment, including their layout and condition that may impact on the electrical practices at the construction site
- the capability, skill, experience and age of people using the electrical equipment
- the systems of work being used
- the range of reasonably foreseeable conditions.

## Monitor and review

Once an electrical risk assessment has been done it must be reviewed by the Assessment Team. The effectiveness of the decisions, which came from the assessment need to be re-evaluated if:

- there is evidence that the risk assessment is no longer valid
- if someone is harmed from exposure to the hazard that the assessment dealt with
- if there are significant changes in the work environment or the work practices concerning the hazard, which the risk assessment addressed.

Section 1 – Assessment Team	
Employer/Principal Contractor:	Telephone:
Assessment completed by:	
Licensed electrician:	Licence No:
Employee representative/s (OHS committee representative or OHS representative or other agreed site representative):	
Site safety employee representative/s:	
Section 2 – Assessment details	
Site address:	
Work location:	
Assessment date/s:	Review date:

<b>Section 3: Specific risk control measures</b>  <b>Note:</b> These are compulsory fields. If you mark a NO in this section of the assessment report, you need to take appropriate action to eliminate or control the hazard in accordance with the guidance described in relevant clauses of this code.	<b>Yes</b>
Is there a program in place for the regular inspection, testing and tagging of electrical equipment by a licensed electrician?	
Is there a program in place for the site maintenance of electrical equipment by a licensed electrician?	
Are records of inspection, testing and maintenance of electrical equipment completed by a licensed electrician?	
Is a record or register of inspection, testing and maintenance available for review by a WorkCover Inspector and other relevant persons?	
Are all socket-outlets used for construction work protected by 30mA RCDs that are regularly tested?	
Is a work procedure in place that ensures RCDs that have tripped due to an apparent fault been assessed by a licensed electrician before reset?	
Do portable socket outlet assemblies (power boards) comply with the requirements of this code?	
Are flexible extension cords being used safely and not lying in mud or water or in areas where they can be damaged or become tripping hazards?	
Are flexible extension cords run on hangers or stable stands where necessary to provide a safe work route through the work area?	
Are flexible extension cords that are used on site the heavy duty type and fitted with non-rewirable or transparent plugs and sockets?	
Are flexible extension cords of the correct size and length as required by Table 1 of this code?	
Are flexible extension cords (where relevant) confined to the same floor as the supply switchboard?	
Is a work procedure in place that ensures portable power tools and electrical equipment that is brought onsite in safe condition and inspected and tagged prior to its introduction to service?	
Is a work procedure in place that ensures unserviceable power tools and electrical equipment is immediately withdrawn from service?	
Is a work procedure in place to prevent mechanical damage to flexible extension cords that are required to be placed on open ground?	
Is a work procedure in place that ensures the use of coupling accessories when flexible extension cords are linked together when used outdoors or in situations such as metal decks or metal roofs?	
Are portable generators suitable for the task and comply with the requirements of Chapter 6 of this code?	

<b>Section 4 – Additional assessment factors</b>	
Indicate in the following manner	
<input checked="" type="checkbox"/> Acceptable <input checked="" type="checkbox"/> Not Acceptable <input type="checkbox"/> N/A Not Applicable	
Electrical hazard reporting and investigation system in place?	
Safe work methods statements available (where appropriate)?	
Workers trained and competent in the safe use of electrical equipment?	
Has information about previous injuries, illness and dangerous incidents relating to the use of electrical equipment been assessed?	
Serviceability and routine maintenance of the electrical equipment	
Working environment in which the electrical equipment is used (eg wet or dusty) or likelihood of mechanical damage	
Frequency of use and duty cycle of the electrical equipment	
Prevention measures against misuse of the electrical equipment (including the prevention of inappropriate application of the electrical equipment)	
Analysis of previous inspection and testing records conducted	
<b>Other assessment factors:</b>  1.  2.  3.	
<b>Assessment results and determination:</b>	
<b>Three monthly inspection and testing interval approved      Yes / No</b>	

\_\_\_\_\_  
**Assessment completed by, name**      \_\_\_\_\_ **Signature**      \_\_\_\_/\_\_\_\_/\_\_\_\_ **(Date)**

\_\_\_\_\_  
**Approved by, name Employer/or**      \_\_\_\_\_ **Signature**      \_\_\_\_/\_\_\_\_/\_\_\_\_ **(Date)**  
**Principal Contractor**

## **APPENDIX 2 – WORKERS COMPENSATION INSURANCE**

Anyone who employs workers, and in some cases engages contractors, must maintain a workers compensation insurance policy. Penalties apply for failing to have a current policy in place.

All employers have a legal liability to pay workers compensation to workers who are injured in the course of their work, and employers are required by law to hold a workers compensation insurance policy from a licensed WorkCover NSW insurer to cover that liability.

For workers compensation insurance purposes the Workplace Injury Management and Workers Compensation Act 1998 defines a 'worker' to be:

Any person who works under a contract of service or a training contract with an employer, whether by way of manual labour, clerical work or otherwise, and whether the contract is expressed or implied, or is oral or in writing.

In addition, the Workplace Injury Management and Workers Compensation Act 1998 deems certain other persons to be workers for workers compensation purposes eg some types of contractors.

For assistance in clarifying your obligation contact your insurer or the WorkCover Assistance Service on **13 10 50**.

## APPENDIX 3 – USEFUL PUBLICATIONS

### WORKCOVER NSW APPROVED INDUSTRY CODES OF PRACTICE

- *Code of practice: Occupational Health and Safety Consultation*
- *Code of practice: Risk assessment*
- *Code of practice: Occupational Health and Safety induction training for construction work*
- *Code of practice: Low voltage electrical work*
- *Code of practice: Work near overhead power lines*
- *Code of practice: Moving plant on construction sites*
- *Code of practice: Technical Guidance*

**Note:** Some of the Australian Standards listed below are also approved industry codes of practice.

### GUIDES

- *Competent Person for Testing and Tagging Electrical Equipment*
- *Contractor's Checklist – Electrical practices for construction work*
- *Hazpak! Making your workplace safer*
- *Identification Tool for Electrical Hazards on-site*
- *Subby Pack – OHS contractor management tool*
- *Dangers of Power Lines when Pumping Concrete*
- *WorkCover Safety Alert – Tiger Tails*
- *Temporary Wiring for Construction Work #*

Standards and Codes offer practical guidance on health and safety for construction work. However, these are subject to change from time to time. For further information contact the WorkCover Assistance Service on: **13 10 50** or visit **[www.workcover.nsw.gov.au](http://www.workcover.nsw.gov.au)**

For information about the wide range of other codes of practice, certification guides and publications on OHS, rehabilitation and workers compensation contact the Publications Order line: 1300 799 003.

Information on the latest laws can be checked at **[www.legislation.nsw.gov.au](http://www.legislation.nsw.gov.au)** or contact 1300 656 986.

# An industry specific training course and resource manual has been developed for licensed electricians who carry out temporary electrical wiring work on construction sites. For further information about the training course and associated resource manual contact the Electrical Trades Union of Australia – NSW Branch on phone (02) 9267 4844 or visit **[www.etunsw.asn.au](http://www.etunsw.asn.au)**

## AUSTRALIAN STANDARDS

Australian Standards can be purchased from SAI Global by contacting the Customer Service Centre on 13 12 42 or over the net at [www.saiglobal.com/shop](http://www.saiglobal.com/shop)

<b>AS 1674.2</b>	Safety in welding and allied processes
<b>AS/NZS 1680.0</b>	Interior lighting – Safe movement
<b>AS 1735.1</b>	Lifts, escalators and moving works – General requirements
<b>AS 1735.2</b>	Lifts, escalators and moving works – Passenger and goods lifts – Electric
<b>AS/NZS 2293.1</b>	Emergency evacuation lighting for buildings – System design, installation and operation
<b>AS 2790</b>	Electricity Generating Sets – Transportable (up to 25kW)
<b>AS/NZS 3000</b>	Electrical Installations (Australia /New Zealand Wiring Rules)
<b>AS 3010</b>	Electrical installations – Generating sets
<b>AS/NZS 3012</b>	Electrical Installations – Construction and demolition sites
<b>AS/NZS 3017</b>	Electrical Installations – Testing and inspection guidelines
<b>AS/NZS 3760</b>	In-service safety inspection and testing of electrical equipment

## NETWORK OPERATORS – CONTACT NUMBERS

- Energy Australia: 13 15 25
- Integral Energy: 13 10 81
- Country Energy: 13 23 56







Catalogue No. **WC00301** WorkCover Publications Hotline **1300 799 003**



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