

## **Electrical workers and contractors**

### What law applies

Legal requirements for the electrical industry, including the Act, Regulation and codes of practice

### What is electrical work?

Electrical work is the manufacturing, constructing, installing, testing, maintaining, repairing, altering, removing or replacing electrical equipment

### Always work de-energised

Working de-energised is the safest option when working with electricity

### Do you ever really have to work live?

Working live should only be your last option, testing is live work

### Managing risks

Information about the risk management process

### Types of electrical work

Including construction work, electrical medical equipment, air conditioning and switchboards

### Dangers

Dangers associated with electricity are electric shock, arcing, explosion or fire and toxic gas from fire

### Hazards

Electrical hazards can be present in confined spaces, hazardous areas and working at heights

### Electrical equipment and tools

Who can test electrical equipment, how often should electrical equipment be tested

### Accredited auditors

Types of accredited auditor, find an accredited auditor

## What law applies

In order to understand the safety requirements for electrical workers and contractors and your obligations for electrical safety you must consider and understand relevant legislation and codes of practice.

### ***General electrical safety obligations***

To understand your obligations and electrical safety requirements you must be familiar with the:

- *Electrical Safety Act 2002* which imposes obligations on people at workplaces to ensure workplace health and safety.

The *Electrical Safety Act 2002* also helps you to meet your electrical safety obligations through the:

- *Electrical Safety Regulation 2002* which describes what must be done to prevent or control certain hazards which cause injury or death
- Codes of practice which are designed to give practical advice about ways to manage exposure to risks common to industry.

You also have obligations and safety obligations under the *Workplace Health and Safety Act 1995*.

Where the *Workplace Health and Safety Act 1995* and the *Electrical Safety Act 2002* both apply to a situation, the *Electrical Safety Act 2002* takes precedence.

Every Queensland employer must have **workers' compensation** insurance. Most employers insure with WorkCover Queensland, while a small number of large organisations have their own insurance. This insurance coverage ensures that employees injured at work receive financial support.

### ***What you must do***

If the regulation describes an electrical risk at your workplace, you must do what the regulation says, and

If there is a code of practice about an electrical risk at your workplace you must either:

- do what the code says, or
- adopt another way that identifies and manages exposure to the risk that is equally effective to, or more effective than, what the code says, and

- ensure you take reasonable precautions and exercise proper diligence.

If there is no regulation or code of practice about a risk at your workplace you **must** choose an appropriate way to manage exposure to the risk and take reasonable precautions and exercise proper diligence about the risk. See the Risk Management Advisory Standard 2000 for further information.

### ***Specific regulations for electrical workers and contractors***

*Electrical Safety Regulation 2002.*

### ***Specific codes of practice for electrical workers and contractors***

There is one code of practice that describes the main electrical safety problems linked to electrical workers and contractors and gives practical advice on how to address them:

#### *Code of Practice for Electrical Work*

Where electrical safety risks exist at your workplace you **must** either:

- do what the code says, or
- adopt another way that identifies and manages exposure to the risk that is equally effective to, or more effective than, what the code says, and
- ensure you take reasonable precautions and exercise proper diligence.

## What is electrical work?

Electrical work is the manufacturing, constructing, installing, testing, maintaining, repairing, altering, removing or replacing of electrical equipment.

Examples include:

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

**In order to understand the safety requirements for doing electrical work and your obligations for electrical safety, you must consider and understand relevant legislation and codes of practice.**

The *Code of Practice - Electrical Work* outlines practical ways of performing electrical work safely, reducing the likelihood of injury or property damage.

It sets **minimum requirements** to meet safety standards. You can also work in a way that is equal to, or better than, the way set out in the code of practice.

### ***Who is affected?***

The *Code of Practice - Electrical Work* directly applies to:

- electrical workers;
- employers and self-employed electrical workers; and
- electrical contractors.

These may include:

- restricted electrical licence holders;
- electrical work training permit holders;
- licensed electrical linespeople;
- licensed jointers;
- licensed electrical fitters; and
- licensed electrical mechanics.

## Always work de-energised

### Why work de-energised?

It is far safer to work de-energised. Work de-energised unless there is no reasonable alternative and all regulatory requirements for safety have been met

### Testing is live work

Always consider parts are live until you can prove otherwise

### High voltage isolation

High voltage presents a higher level of hazards – and that applies when dealing with isolation and access too

## ***Why work de-energised?***

It is far safer to work de-energised. Work de-energised **unless there is no reasonable alternative** and all regulatory requirements for safety have been met.

'**No reasonable alternative**' means that there is a greater safety risk if a situation is de-energised.

**Working de-energised also applies to all electrical equipment** – from appliances and cables to switchboards and electrical accessories.

It will mean isolating and disconnecting power supply and proving that the parts are de-energised **before** carrying out further work.

## **Safe isolation**

- All sources of electrical voltage will need to be de-energised. This may involve more than one isolation point.
- Remove hazards from other sources of energy eg. spring tension or hydraulic pressure.
- Prominently tag parts that have been de-energised with a warning or safety sign.
- **Prove** parts are de-energised.
- Remember that you may be working near other exposed live parts

Refer to Section 5.4.2 of the *Code of Practice - Electrical Work* for more details on isolating and disconnecting.

## ***Testing is live work!***

Always consider parts are **live** until you can prove otherwise.

You can use a range of devices to prove successful isolation of power. You need to know:

- which is the right device for the particular job
- how to use it properly
- its technical limitations
- what makes for a conclusive test.

**Testing is live work so all of the requirements to perform live work must be met.**

If there is **any** doubt about parts or connections being electrically safe:

- ensure the electrical work, or affected part of the electrical work, is isolated, disconnected and made safe; and
- make sure the electrical work remains safely isolated until the matter is resolved (i.e. further advice or assistance sought and acted on).

Refer to Section 6.5.1 of the *Code of Practice - Electrical Work* for procedures for fault finding and testing.

Refer to Section 6.5.2 of the *Code of Practice - Electrical Work* for details on ensuring correct connections (including polarity).

## ***High voltage isolation***

High voltage presents a higher level of hazards – and that applies when dealing with isolation and access too.

### **Hazard identification**

Additional hazards include:

- induction from other circuits and communications equipment such as radio transmitters;
- build up of static charges due to weather conditions;
- ferro-resonance;
- feedback from secondary or tertiary systems;
- stored energy in high voltage capacitor banks; and
- working under or over other live conductors.

## **Control measures**

People near exposed live high voltage parts must maintain the safe approach limits detailed in Section 3 of the Code of Practice - Working Near Exposed Live Parts and Section 3.7 of the Code of Practice - Electrical Work.

If you are within the safe approach limits, the parts **must be isolated, tested and proved de-energised and earthed**. Refer to Section 11 'Requirements for electrical work' of the *Electrical Safety Regulation*.

Section 5.4.3 of the Code of Practice details the process of proving de-energised status

Section 5.5.2 of the Code of Practice details the safe system of work that must be used for high voltage isolation and access.

## Do you ever really have to work live?

### What is live work?

Live work means electrical work performed under circumstances in which the part of the electrical equipment that is the subject of the electrical work is energised

### Working live safely

If there is no reasonable alternative and work must be carried out 'live', then there are requirements that must be met

### Using safety observers

Where live work is being conducted that is not testing electrical equipment, it is mandatory to have a safety observer

## ***What is live work?***

Live work means electrical work performed under circumstances in which the part of the electrical equipment that is the subject of the electrical work is energised.

Examples include:

- testing components of a television set that's switched on to carry out a repair;
- testing to ensure correct connections (including polarity); or
- tightening the terminals of live circuit breakers.

## **Live work is dangerous**

It may be necessary to do some live work to test equipment.

Working 'live' should only be performed when there is no reasonable alternative.

A 'reasonable alternative' **does not mean** something frivolous like not wanting to take the time to de-energise because you are in a hurry.

Live work may be considered if working de-energised posed greater safety risks.

## **Live work is restricted**

The *Code of Practice - Electrical Work* limits live work tasks to minimise dangers.

Breaching the code carries maximum penalties.

### ***Working live safely***

If there is no reasonable alternative and work must be carried out 'live', then **all of these requirements must be met:**

- it is not practicable to perform the electrical work other than by live work because of one or more of the following:
  - it is necessary in the interests of safety, for the work to be performed while the electrical equipment subject to electrical work is energised. For example: 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
  - a supply of electricity is necessary for the proper performance of the electrical work
  - there is no reasonable alternative to performing the electrical work by live work. For example: it may be necessary, to avoid widespread outages, to perform electrical work on the works of an electricity entity by live work
- the employer or self-employed person has prepared, in a document, a risk assessment of the live work
- the performance of the electrical work is in accordance with a safe system of work
- 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 subject to the electrical work
- the person who performs the live work has appropriate training for the performance of the live work
- testing equipment appropriate to the performance of the live work has been given to the person performing the electrical work. This testing equipment has also been properly maintained and the person performing the live work uses the testing equipment correctly in performing the work
- clothing and personal protective equipment appropriate to the performance of the live work has been given to the person performing the work and is used correctly by the person performing the work
- the isolation point of the electricity supply for the electrical equipment subject to electrical work has been clearly identified and (except for electric line work) is able to be reached quickly without the need to climb over or shift obstructions
- the area where the electrical work is performed is clear of obstructions to the extent necessary for easy access to and from the area
- there is a safety observer observing the performance of the electrical work, unless the work involves testing electrical equipment, and the

risk assessment does not show there is a high risk to electrical safety in performing the testing of the electrical equipment

Read Section 12 of the *Electrical Safety Regulation 2002* to obtain the complete regulatory requirements.

### **Points to remember!**

Don't wear these if you're doing electrical work:

- neck chains
- rings
- watches
- bracelets
- earrings or body piercings
- metal-rimmed glasses

**Make sure you have space around you to move freely at all times, without danger. For example, if you sneeze, you're not going to involuntarily touch exposed live parts.**

Think about what you need to wear and when. For example:

- insulated gloves
- fire-retardant or flame-resistant material that covers arms, legs and body
- non-conductive footwear

Use the right tools, instruments and equipment for the job. Always check that your tools are working properly and properly insulated. Section 6.4 of the Code of Practice details what tools, instruments and equipment should be used to work safely with electricity.

### ***Using safety observers***

Where live work is being conducted that is not testing electrical equipment, it is mandatory to have a safety observer.

Where the work involves testing electrical equipment, a safety observer may not be required; however a risk assessment may indicate the need for a safety observer.

A safety observer is required for testing electrical equipment work where the risk assessment shows there is a high risk to electrical safety in performing the testing work.

**The safety observer (electrical) is there to:**

- warn workers of danger;
- perform rescue and resuscitation, if needed; and
- stop work before risks become too high.

**The safety observer (electrical) should not:**

- carry out work that compromises the role of observation;
- have to observe more than one task at a time;
- be situated in the work basket of an elevating work platform; or
- be regarded as the sole control measure to ensure electrical safety.

Refer to Section 6.3.4 of the Code of Practice for more details on safety observer (electrical).

# Managing risks

## *Working safely*

1. **Identify** hazards in a work situation.
2. **Assess** the risk of injury or damage to property that the hazard presents.
3. From this assessment, devise a list of ways to **minimise** risks or **eliminate** hazards. Think how you can:
  - eliminate risk;
  - substitute with a less hazardous material, process or equipment;
  - redesign equipment or work process;
  - isolate the hazard;
  - introduce administrative controls; and
  - use appropriate personal protective clothing.
4. **Implement** control measures.
5. **Monitor** and review their effectiveness.

Refer to Section 4.3 of the Code of Practice for help in identifying hazards.

Appendix B details further information on electrical hazards.

Be aware of other issues not directly relating to electrical safety that may pose hazards too. For example, working on roads or in confined spaces. Read more general information on risk management.

## **Types of electrical work**

### Working on construction sites

Including construction wiring, switchboards, cords and cables, lighting and relocatable construction premises

### Electrical medical equipment

What is involved in testing and tagging medical equipment

### Air-conditioning installations

Who can perform these installations

### Working with older switchboards

Workers should be aware that asbestos can be present in older switchboards

## ***Working on construction sites***

The *Electrical Safety Regulation 2002* requires electrical contractors to comply with AS/NZS 3012 (*Electrical Installations – Construction and Demolition sites*) for construction work.

Sub-standard 'temporary' electrical installations on construction and demolition sites are unlawful.

The law affects six areas:

- construction wiring
- switchboards
- flexible cords, cord extension sets, flexible cables and accessories
- lighting and luminaries
- inspection and testing
- relocatable construction premises and other electrical equipment on site.

## **Construction wiring**

With certain exceptions, construction wiring must comply with AS/NZS 3000 *Electrical Installations*.

## **What the Standards require**

- Use different coloured cables for construction and permanent wiring so that the two can be told apart. Or attach iridescent yellow label marked 'construction wiring' every five metres.
- Install wiring and cables so that they are unlikely to be damaged. For example, fixed wiring supplying a switchboard may be on a ceiling. Alternatively provide added protection such as a steel cover strip.
- Visual checks of construction wiring, including switchboards, must be carried out every six months. If damage or sub-standard work is detected, the work must be fixed and tested.
- Relocatable construction premises, fixed and transportable equipment must be tested every six months.
- Flexible cords need to run in a way that protects against damage. For example, held off the floor or run in a manner that provides protection such as a formed trough.
- If natural light is poor, install battery-powered emergency lighting in stairways, passages and next to switchboards (AS2293.1).
- Install separate circuits for lighting, power points, relocatable construction premises and other specific electrical equipment (AS/NZS 3000).
- Ensure final sub-circuits for construction wiring are protected by a maximum 30mA safety switch at the switchboard where the final sub-circuit originated. This does not apply to equipment where safe operation could be placed at risk, for example, cranes or lifts for people.
- Use insulated aerial conductors. This does not apply to electrical entities. See Section 64A of the *Electrical Safety Regulation 2002*.
- Cables supported by a catenary should consist of stranded or flexible cable, using double insulation as a minimum.
- When setting up overhead construction wiring, avoid crossing roads or access ways that may be used by cranes, high loads or heavy machinery. It would be better to place wiring underground.
- Clearly mark where underground wires travel and record it at the workplace.
- If overhead cables must be used, place warning flags six metres both side and 0.6 metres below the wires and cables.

## Switchboards

Switchboards must be easy to access and protected from damage.

### What's not acceptable

- Substandard boards – such as those **temporarily** fixed to star pickets or temporary fences, or boards connected to other boards by plugs

### What the Standards require

- Secure attachment to a pole, post or wall – or be stable or freestanding.
- A means of supporting flexible cables off the floor eg. cross arm.
- Isolating switch marked
- Clearly identify extra switches for :
  - final sub-circuits intended to operate after hours
  - emergency systems.
- Include isolating device for securing isolating switch in open position.
- Power supplied by permanent wiring protected by a maximum 30mA safety switch, either in the board of the final sub-circuit or by portable unit connected to a lead no more than two metres long.
- Carry a 'caution' or 'danger' safety sign -- or both – to warn of electrical hazard.
- Identifiable as a single unit, if more than one at workplace, by either number, letter or mix of two.
- Robust – able to withstand damage.
- Suited to environmental conditions.
- Live parts protected to prevent contact by anyone connecting or disconnecting plugs and appliances.
- An insulated anchorage tie bar included to prevent straining on cables if power points are used on the board.
- If fitted with power points, have an insulated slot in base for plugs to go through and a sign fitted reading 'Keep closed. Run all leads through bottom.'
- Fixed doors or lids so that they:
  - are kept closed except for access
  - need a tool for removal
  - are lockable
  - can be positively held open.
- At least one board on each level. Note, a single domestic residence does not require distribution switchboard on each level.

## Flexible cords, cord extension sets, flexible cables and accessories

### What's not acceptable

- Using coiled or reeled leads
- Using an extension lead on a level different to the one that the switchboard it is plugged into is on
- Multiple or extension leads longer than 25 metres for 1mm<sup>2</sup> conductor area
- No protection from damage
- No safety switch protection to the leads.

### What the Standards require

- **Test and tag at three monthly intervals**
- Heavy-duty sheathing for flexible cords used in extension leads (AS/NZS 3199 *Approval and test specification for cord extension sets - Cord extension sets*).
- Minimum rating 10amp.
- Minimum cable size 1mm<sup>2</sup> - maximum length 25m, longer for heavier cables.
- Not joined to exceed maximum length to size (as above).
- leads on electrical equipment greater than five metres long to comply with extension lead requirements, heavy duty.
- Shrouded sockets of cord extension sets comply with AS/NZS 3120 *Approval and test specification for cord extension sets - Cord extension sets*.
- Extension leads confined to the level of the switchboard they originate from. Domestic construction confined to one storey up or down from the switchboard they originate from, except for lift and service shafts, stairwells, formwork and external staging.
- Not used while coiled or reeled.
- Protected from mechanical damage, liquid or high temperature.
- Where flexible cords are more than four metres from the electrical equipment they are connected to, or not in view of the user, the cords must be protected from mechanical damage, liquid or high temperature or supported off the floor or ground on insulated stands or hangers.
- Portable power boards Class H, complying with AS/NZS 3123 *Approval and test specification - Plugs, socket-outlets and couplers for general industrial application* or IEC60309 *Plugs, socket-outlets and couplers for industrial purposes* (non-Queensland Government link).
- Overload protection, complying with AS/NZS 3111 *Approval and test specification - Miniature overcurrent circuit-breakers* or AS/NZS 60898.1 *Electrical accessories - Circuit-breakers for overcurrent protection for household and similar installations - Circuit-breakers for a.c. operation*, where three or more power points are fitted to portable power board.

## Lighting and luminaries

### What's not acceptable

- Temporary lighting not fitted with a mechanical guard, in an area where the light could be damaged.
- Plugging lighting into unearthed bayonet plug
- Supplying lighting from a circuit not protected by a safety switch.

### What the Standards require

- Protection from mechanical damage.
- Supplied from a final sub-circuit of construction wiring provided with a maximum 30mA safety switch protection.
- Hand held complies with AS/NZS 60598.2.8 *Luminaires - Particular requirements – Handlamps*.
- Portable lights provided with IP2X protection, *AS1939 Degrees of protection provided by enclosures for electrical equipment (IP Code)* (non-Queensland Government link) with a mechanical guard for lamp and adequate stability.

## Inspection and testing

### What the Standards require

- Visual inspection and testing of construction wiring switchboards **every six months**.
- Portable safety switches need **daily checking** using pushbutton test before use, and then every three months by a competent person.
- Fixed safety switches require **monthly** pushbutton test and then every 12 months by a competent person.
- Relocatable construction premises (site sheds and amenities) tested every six months.
- Electrical equipment on construction and demolition sites, every three months.
- All records of inspection and tests are to be kept.
- Records are to include –
  - register of all equipment;
  - record of formal inspections and tests;
  - repair register; and
  - record of faulty equipment.
- Tag new equipment with test or re-test date.
- Fit durable, non-reusable, non-metallic tag to compliant equipment.

- Construction wiring, switchboards, fixed safety switches, fixed and transportable equipment do not need to be tagged.
- Non-compliant equipment must be withdrawn from use immediately, a warning label attached, and it sent away for repair or disposed of or destroyed.

## **Relocatable construction premises and other electrical equipment on site**

### **What the Standards require**

Electrical installation must comply with AS/NZS 3000 *Electrical installations* or AS/NZS 3001 *Electrical installations - Relocatable premises (including caravans and tents) and their site installations* and these requirements:

- Supply not to be taken from inside other relocatable premises.
- Use the power points inside the relocatable premises only to power electrical equipment and lighting within.
- Power points installed on the outside of the relocatable premises shall only power
  - electrical equipment and lighting immediately beside the structure; and
  - other relocatable premises when the power point is part of an interconnecting system, maintaining requirements for flexible cords.
- Power point inside or outside relocatable premises not to be used to power an appliance inlet on the same relocatable premises.
- All components forming part of an interconnecting system for relocatable premises shall be of equal or greater current rating than the protective device that protects the system.
- Flexible leads supplying relocatable premises are to be no more than 15 metres long.
- Inspection and testing of relocatable premises in line with AS/NZS 3760 *In-service safety inspection and testing of electrical equipment*.

### **Legislation**

Contract documents should include the following electrical legislation and other requirements for Queensland as a minimum:

- *Electrical Safety Act 2002* (Qld)
- *Electrical Safety Regulation 2002* (Qld)
- Code of Practice - Working near exposed live electrical parts
- Code of Practice - Electrical work

- Code of Practice - Works (protecting earthing, underground cable systems and maintenance of supply structures for power lines)
- AS/NZS 3000 *Electrical Installations*
- AS/NZS 3012 *Electrical Installations – construction sites*.

### ***Electrical medical equipment***

Medical equipment is a specialised type of electrical equipment. There is testing that should be followed beyond those tests required by the *Electrical Safety Regulation 2002*.

### **Stricter tests required**

There are Australian Standards that have stringent testing of electrical medical equipment to heighten safety aspects of this equipment .

The following are recommended by AS/NZS 3551 *Technical management programs for medical devices*:

- protective earth test
- insulation resistance test
- earth leakage current test
- applied part leakage current test
- mains contact current test.

Also refer to:

- AS/NZS 4513 *Medical electrical equipment – fundamental aspects for safety*
- AS3200.1 *Approval and test specification for medical electrical equipment – general requirements for safety*.

Some aspects of Workplace health and safety legislation also need to be considered to ensure patient safety.

**Only a person deemed competent under the *Electrical Safety Regulation 2002* may perform this testing.**

A **competent person** is a person who has acquired, through training, qualification, experience or a combination of these, the knowledge and skill enabling that person to inspect and test medical equipment.

### ***Air-conditioning installations***

## **Who can do what?**

An electrical contracting licence is required to install an air-conditioning unit.

**Only an electrical mechanic can install wiring between the inside and outside units or perform installation work on the circuit supplying an air-conditioner.**

A restricted electrical licence is intended to allow a non-electrical tradesperson capacity to safely perform simple electrical maintenance tasks incidental to their trade.

**A refrigeration mechanic holding a restricted electrical licence cannot perform electrical installation work.**

But a refrigeration mechanic with a restricted licence **can disconnect and reconnect electrical equipment** and replace like with like electrical components of air-conditioning and refrigeration equipment.

Electricity is dangerous and electrical safety inspections have revealed incorrect and unsafe air-conditioning installations carried out under restricted licences. Severe penalties may be incurred for unlicensed work.

## ***Working with older switchboards***

### **Be asbestos-aware**

Old Zelemite (black) electrical switchboards can contain up to 20% asbestos.

If you are working on an electrical switchboard that's aged (pre 1987), assume presence of asbestos, even if it is not labelled as such.

Adopt work practices that will generate as little dust as possible and contain any dust that is made.

Refer to:

- *Workplace Health and Safety Regulation 1997* - Division 1 (on-site management of asbestos materials) Part 11
- Workplace health and safety subject – asbestos

### **Potential fault**

The Electrical Safety Office wants all electrical installations containing switchgear inspected for damage.

A type of switchboard manufactured in the 1960s has been found to have a potential fault.

This follows an incident where it appears cables within the combined fused switch carriage shorted to earth, causing a severe electrical fault and fire at a major public institution.

In inspecting for damage, particular attention should be drawn to:

- broken and deteriorated tension springs;
- damaged cables within the combined fused switch carriage;
- heat damage to connection points; and
- foreign and loose items within the fused switch carriage.

## Dangers

Electricity cannot be seen, heard or smelt. This makes hazards hard to detect.

The three most common electrical hazards and causes of injury are:

- electric shock, causing injury or death;
- arcing, explosion or fire, causing burns; and
- toxic gases from burning or arcing, leading to illness or death.

These three hazards may be present individually or together.

Example of all three combined:

A fault occurs in the main switch-room of a large shopping centre. It's possible that the ground may become 'live' as a conductor. There could be an explosion. Burning of PVC and epoxy resins may create a hazardous atmosphere.

## Hazards

The three common hazards associated with electrical work are electric shock, burns and toxic gases released by the burning of certain electrical components.

These can occur in the following circumstances:

Confined spaces

Hazardous areas

Working at heights

Working in and around dug-out spaces

### ***Confined spaces***

You need to ensure that even in tight spaces; you have enough room to move freely without exposing yourself unintentionally to a live part.

For example, the involuntary movement caused by a sneeze could put you at risk.

Also ensure you have adequate ventilation.

### **Warning: live parts' exposure in lift control**

Cramped conditions typical of lift motor rooms and awkward positioning increases the likelihood of electric shock hazards when performing lift maintenance.

Hazards may also exist from unguarded pulley/chain and cable drum movements.

An incident involving a worker who accidentally touched exposed bare terminals connected to hazardous voltage while performing lift maintenance has prompted a safety warning from the Electrical Safety Office.

The particular installation involved an older-style OTIS I-SOB model.

But the Electrical Safety Office warns other makes, models and vintages may have dangerous exposed terminals or parts.

It says all lift installations should be reviewed and control measures put in place to minimise electrical, mechanical or other hazards.

Suitable controls may include enclosures and guards, complying with *Electrical Safety Act 2002*.

## ***Hazardous areas***

'Hazardous areas' are those where flammable materials are generated, prepared, processed, handled, stored or used, posing potential danger.

### **Standards for hazardous area equipment**

Australian Standards (AS/NZS 2381.1 *Electrical equipment for explosive atmospheres - Selection, installation and maintenance - General requirements*) stipulate that all equipment used in hazardous areas must be certified with 'AUS Ex' or 'IEC Ex'.

'AUS Ex' certification scheme for electrical equipment finished in December 2003; replaced by the 'IEC Ex' standard.

**This is not the same as 'ATEX certified'.**

ATEX is a manufacturer self-certification scheme, set up to support the sale of electrical equipment used in potentially explosive situations, in the European Union.

**ATEX certification only is not enough to satisfy Australian Standards or to meet obligations established in Queensland's stringent electrical safety laws.**

Electrical contractors should specify use of conforming equipment. If supplied equipment is ATEX-certified only, a written assessment from a suitably qualified person is needed; indicating whether the standard the equipment was manufactured to aligns with equivalents demanded by Australian Standards.

## ***Working at heights***

Working with ladders, scaffolds and portable platforms

Working with elevating work platforms (EWPs)

Working on or from poles and towers

### **General information**

Working at heights **and** with electricity makes work doubly risky.

You need to be aware of general workplace health and safety requirements relating to working at heights as well as electrical safety issues.

### **Working with ladders, scaffolds and portable platforms**

Ladders, scaffolds and portable platforms are used a lot in carrying out electrical work.

The three common hazards – electric shock, burns and toxic gases -- may all be encountered.

### **Control measures**

Some ways to implement a safe system of work include:

- using equipment that is fit for purpose eg. non-conductive ladders;
- identifying if there are nearby exposed live parts;
- if there are exposed live parts nearby, taking necessary precautions eg. de-energise, fit covers, use a safety observer (electrical); and
- employing work practices such as:
  - two or more people carrying long devices in switchyards and switchrooms in a position below shoulder height;
  - two people handling extension ladders in windy conditions; and
  - restraining ladders using head ropes or foot ropes, or both.

Refer to the *Code of Practice for Electrical Work* for more details.

### **Working with elevating work platforms (EWPs)**

Elevating work platforms including scissor lift and boom type machines are used widely throughout the electrical industry.

The Code of Practice for Electrical Work sets out detailed guidelines for carrying out electrical work using elevating work platforms

You also need to be aware of Workplace health and safety provisions for using EWPs.

Remember to check the safety observer danger zones.

### **Warning on single operating lever elevating work platform**

The Electrical Safety Office has been made aware that the design and operation of a particular elevating work platform could pose unsafe situations for workers.

The Versalift truck-mounted boom lift can perform up to three different movements simultaneously. In particular it can retract the boom telescopically while raising the boom arm angle.

This possibility may be exacerbated by the arrangement of the 'deadman switch' in the operating handle. The 'deadman switch' is under the operating handle. Pressure to engage this button is in the same direction as what's needed to raise the boom.

This could result in the boom arm angle being mistakenly raised, leading to a net upward movement that may not be immediately obvious. It could be dangerous.

## **Working on or from poles and towers**

Always inspect poles before commencing an electrical work.

Think about:

- the pole's structure i.e. wood, steel, concrete
- whether the pole is owned by a supply entity or not
- whether the work is to be performed from the pole or from another device, such as an elevating work platform.

The *Code of Practice - Electrical Work* details what to look for and what tests to conduct on poles in establishing a safe system of work.

## **Working in and around dug-out spaces**

When working in or around trenches, pits and underground ducts, you may encounter electrical hazards such as:

- live cables, damaged by excavation or hole boring equipment;
- exposed live parts;
- earthed situations in which conductive materials like metal pipes or liquids such as storm water create an electric shock path; or
- spark generations in an explosive atmosphere (eg. presence of LP gas).

## **Control measures**

Some ways to implement a safe system of work in these situations include:

- perform electrical and associated work only on **de-energised** parts;
- use mats and eliminate or avoid liquids to remove the risk of an earthed situation;
- if parts of a cable are exposed, **treat the cable as live high voltage until you can determine otherwise**; and
- remove cables from conduits before work **or disconnect power supply to cable before work begins**.

For more details, refer to working in and around trenches, pits and underground ducts section of the *Code of Practice for Electrical Work*.

## Electrical equipment and tools

### ***Who can test electrical equipment?***

Only a person deemed competent by their employer by law can test and tag electrical equipment.

**It is an offence under the *Electrical Safety Act 2002* to repair any electrical equipment that you find is faulty, unless you have the appropriate electrical work licence.**

Competence is based on knowledge and skills gained through training, experience, qualifications or a combination of these.

### ***How often to test***

How often specified electrical equipment and safety switches are tested depends on the class of workplace they are used in:

<b>Category</b>	<b>Portable electrical equipment</b>	<b>Type 1 or 2 safety switch (fixed)</b>	<b>Type 1 or 2 safety switch (portable)</b>
Construction work	At least 3 monthly intervals by a competent person.	<ul style="list-style-type: none"><li>• Use the inbuilt test button (at least monthly).</li><li>• An operating time/current test by a competent person at least annually.</li></ul>	<ul style="list-style-type: none"><li>• Use the inbuilt test button – <b>immediately after it is connected and immediately before it used, first time each day.</b></li><li>• By a competent person, at least every 3 months.</li></ul>

	<b>Specified electrical equipment</b>	<b>Type 1 or 2 safety switch (fixed)</b>	<b>Type 1 or 2 safety switch (portable)</b>
Manufacturing work	<ul style="list-style-type: none"> <li>• If equipment is double insulated, at least every 12 months by competent person.</li> <li>• If not double insulated, at least every 6 months by competent person <b>and connected to a safety switch.</b></li> </ul>	<ul style="list-style-type: none"> <li>• Use the inbuilt test button – at least every 6 months.</li> <li>• An operating time/current test at least every 12 months by competent person.</li> </ul>	<ul style="list-style-type: none"> <li>• Use the inbuilt test button – daily or before each use, whichever is longer.</li> <li>• By a competent person, at least every 12 months.</li> </ul> <p>Note: From 1 March 2008, portable safety switches are not to be used in manufacturing work. Installed safety switches must be used.</p>
Service work	<p>At least 12 monthly intervals by a competent person <b>or connected to a safety switch.</b></p>	<ul style="list-style-type: none"> <li>• Use the inbuilt test button, at least every 3 months.</li> <li>• An operating time/current test by a competent person, at least every 12 months.</li> </ul> <p>Longer test intervals may apply. Consult the Electrical Safety Regulation 2002 and AS/NZS 3760</p>	<ul style="list-style-type: none"> <li>• Inbuilt test button at least every 3 months or before each use, whichever is longer.</li> <li>• An operating time/current test by a competent person, at least every 12 months.</li> </ul> <p>Longer test intervals may apply. Consult the Electrical Safety Regulation 2002 and AS/NZS 3760</p>

Office work	At least 5 yearly intervals by a competent person <b>or connected to a safety switch</b>	<ul style="list-style-type: none"> <li>• Use the inbuilt test button at least every 6 months.</li> <li>• An operating time/current test by a competent person, at least every 2 years.</li> </ul>	<ul style="list-style-type: none"> <li>• Use the inbuilt test button at least every 3 months.</li> <li>• An operating time/current test by a competent person at least every 2 years.</li> </ul>
Amusement work (specified electrical equipment)	<ul style="list-style-type: none"> <li>• If equipment is double insulated, at least every 12 months by competent person.</li> <li>• If not double insulated, at least 6 months by competent person <b>and connected to a safety switch</b></li> </ul>	<ul style="list-style-type: none"> <li>• Use the inbuilt test button – at least every 3 months.</li> <li>• An operating time/current test at least every 6 months by competent person.</li> </ul> <p>Longer test intervals may apply. Consult the <i>Electrical Safety Regulation 2002</i> and AS/NZS 3760</p>	<ul style="list-style-type: none"> <li>• Use the inbuilt test button – daily or before each use, whichever is longer.</li> <li>• By a competent person, at least every 3 months.</li> </ul> <p>Longer test intervals may apply. Consult the <i>Electrical Safety Regulation 2002</i> and AS/NZS 3760</p>
Amusement work (amusement rides and devices)	Inspected and tested each after each onsite assembly , and every six months.		
Rural industry work (all plug in equipment)	Visual examination before each use.		
Rural industry work  (Specified electrical equipment used under stated electrical risk	Either: test and inspect every 12 months <b>or</b> protect with a safety switch.	Recommended push button test every three months.	Recommended push button test every three months.

factors)			
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For construction work, refer to AS/NZS 3012 *Electrical installations – construction and demolition sites* (non-Queensland Government link)

For all other work, refer to the *Electrical Safety Regulation 2002*.

**On completing tests, and on achieving satisfactory results, you must attach a durable tag to the electrical equipment showing when next it is due for an inspection and test. Electrical equipment that fails testing should immediately be withdrawn from use and you must attach a durable tag warning people not to use the equipment.**

## **Accredited auditors**

An accredited auditor is required to inspect high voltage or hazardous area electrical installations prior to connection, or reconnection, to an electrical source. Auditors also inspect electricity entities safety management systems to ensure compliance with the *Electrical Safety Act 2002* (PDF, 788 kB) and the *Electrical Safety Regulation 2002*. (PDF, 801 kB)

**Only an accredited auditor is authorised to perform these inspections.**

**Power supply cannot be connected until an inspection has been carried out and the work deemed safe.**

An accredited auditor will be issued with a photo identity card that is signed. You should ask to see this before an inspection begins.

### ***About high voltage electrical installations***

Section 153 of the *Electrical Safety Regulation 2002* requires an inspection of high voltage electrical installations prior to connection or reconnection to a source of electricity if:

- the high voltage electrical installation is being connected for the first time; or
- electrical installation work has been performed on the high voltage electrical installation.

'High voltage' is defined as greater than 1000V a.c. RMS or 1500V ripple-free d.c.

The pre-commissioning inspection verifies the electrical safety of the installation, and related electrical equipment and protective equipment have suitable certification, and complies with certification documentation and the appropriate standards.

### ***About hazardous area installations***

A hazardous area is defined as an area in which explosive atmosphere is present or may be expected to be present in quantities such as require special precautions for the construction, installation and use of potential ignition sources.

This can be due to the material generated, prepared, processed, handled stored or used in the area.

'Hazardous areas' are those where flammable materials are generated, prepared, processed, handled, stores or used, posing potential danger.

Section 153 of the *Electrical Safety Regulation 2002* requires an inspection of electrical installations in hazardous areas prior to connection or reconnection to a source of electricity if:

- the installation is being connected for the first time; or
- electrical installation work has been performed on an electrical installation within a hazardous area.

This pre-commissioning inspection determines electrical safety of the installation and that associated electrical equipment has suitable certification and documentation.

### ***About installation and safety management systems***

Auditors for accredited safety management systems conduct the following types of audits:

- initial legislation compliance - to ensure that when a safety management system is first put into effect, the system has been assessed and validated against electrical safety legislation
- modification compliance - to verify that modifications to the safety management system align with electrical safety legislation
- safety management system performance - to annually verify, amongst other things, continued legislative compliance and that the safety management system is achieving its objectives

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## Issuing of certificates

Requirements of section 15 of the *Electrical Safety Regulation 2002*

Requirements of section 159 of the *Electrical Safety Regulation 2002*

ESO example certificate

In the majority of cases after completing work on electrical equipment or connecting electrical installations, sections 15 and 159 of the *Electrical Safety Regulation 2002* (the Regulation) require the licensed electrical contractor, under whose licence number the work or connection was performed to issue either a certificate of testing and safety or a certificate of testing and compliance.

The Electrical Safety Office (ESO) has developed an example certificate that may be used to help meet the requirements under sections 15 and 159 of the Regulation. For more information on this certificate please see the **example certificate** section below.

Alternatively licensed electrical contractors' may want to use a commercially available certificate or design their own document (for example an invoice or receipt) provided the certificate/document meets the requirements of sections 15 or 159 (as applicable) of the Regulation.

### ***Requirements of section 15 of the Electrical Safety Regulation 2002***

#### **(Certificate of testing and safety)**

For **electrical equipment**: After performing electrical work that required testing under Part 2, Division 4 of the *Electrical Safety Regulation 2002*, the licensed electrical contractor needs to:

As soon as practicable after testing, provide the person for whom the work was performed a certificate that states the following:

- the name and address of the person for whom the work was performed;
- the details of the electrical equipment tested;
- the day the electrical equipment was tested;
- the electrical contractor licence number under which the electrical equipment was tested; and
- a statement on the certificate that certifies the electrical equipment (to the extent it is affected by the electrical work) has been tested to ensure it is electrically safe.

Keep a copy of the certificate for at least five years after the certificate is given to the person the work was performed for.

## ***Requirements of section 159 of the Electrical Safety Regulation 2002***

### **(Certificate of testing and compliance)**

For **electrical installations**: After connecting an electrical installation (on which electrical work has been performed) to a source of electricity, the licensed electrical contractor needs to:

As soon as practicable after the connection, provide the person for whom the work was performed a certificate that states the following:

- the name and address of the person for whom the work was performed;
- the details of the electrical installation tested;
- the day the electrical installation was tested;
- the electrical contractor licence number under which the electrical installation was tested; and
- a statement on the certificate that certifies the electrical installation (to the extent it is affected by the electrical work) has been tested to ensure it is electrically safe and is in accordance with the requirements of the wiring rules and any other standard applying under the *Electrical Safety Regulation 2002* to the electrical installation.

Keep a copy of the certificate for at least 5 years after the certificate is given to the person the work was performed for.

### ***ESO example certificate***

This certificate can be used as either a certificate of testing and safety or a certificate of testing and compliance. This could make it easier for contractors (especially if issuing certificates in the field) as the one certificate can serve either purpose.

The example certificate is accessible from <http://www.dir.qld.gov.au/electricalsafety/publications/forms/index.htm#workers> in both PDF and MS Word formats.

The certificate has two pages, the first is the actual certificate, the second is a page of frequently asked questions which you may find useful.

### **Benefits of the ESO example certificate**

- This certificate can be used as either a certificate of testing and safety or a certificate of testing and compliance.
- All you need to do is put a mark in the relevant check-box near the top of the certificate then fill out the other details in the spaces provided, give

one copy to the person the work was performed for and keep the second copy as a record for at least five years.

- Printed copies can be filled in by hand and issued in the field.
- Certificates can be personalised by adding your companies details to the box in the top left corner of the certificate by using a stamp or sticker.
- By saving a copy of the **Word example certificate** to your computer, you get a few additional benefits provided your computer has a copy of Microsoft Word installed, see below:
  - You can personalise the certificate by adding your company details to the box in the top left corner of the certificate, which when saved, will appear on every certificate you print.
  - You can also fill in the certificate on your computer, print a copy for the person the work was performed for and also save a copy, which you can keep electronically for your records. Remember to keep a copy for at least five years.
  - Please note: the Word version is a locked document. You can only enter information into designated 'enterable fields' which will appear grey with small circles inside. Click on the area and then enter required information.

For more information on certificates of testing and safety or certificates of testing and compliance see page two (frequently asked questions) of the example certificate.