



Electricity in the rural industry

Using it safely

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Introduction

Electricity is essential in rural industry to power a wide range of equipment and activities. Electrical equipment will only function effectively if it is properly installed, used and maintained.

However, despite its many benefits electricity can expose people and property to a range of risks including electric shock, fire or explosion. It is essential to exercise care around electricity to keep people and property electrically safe.

In 2002, Queensland introduced dedicated electrical safety laws to prevent people from being injured or killed and property from being damaged or destroyed by electricity. The laws now include the *Electrical Safety Act 2002*, the *Electrical Safety Regulation 2002* and the five *Electrical Safety Codes of Practice 2010*:

- *Electrical Equipment Rural Industry*
- *Working Near Exposed Live Parts*
- *Risk Management*
- *Electrical Work*
- *Works*.

These laws and safe practices provide Queensland with a framework to reduce the unacceptable number of electrical fatalities that occur in the home and workplace each year.

Numerous electrical fatalities have occurred in Queensland's rural industry over the years. These incidents commonly involve contact with overhead powerlines through the use of machinery or moving irrigation pipes on properties. Other causes of electrical incidents include lack of electrical maintenance, working barefoot with electric tools and unauthorised electrical handy-work. These deaths could have been prevented if electrical safety had been better managed.

Apart from the suffering caused by death and injury, electrical incidents can cause property damage costing significant amounts of money e.g. arcing or burning from electricity can damage or destroy vehicle frames, gearboxes, engines, axles, tyres etc.

This booklet highlights a range of electrical risks and provides ways to manage electrical safety and prevent electrical incidents in the rural industry. For information in greater detail, please refer to the *Electrical*

Safety Code of Practice 2010 – Electrical Equipment Rural Industry.

Electrical safety in the rural industry can generally be managed by:

- meeting the requirements and using the practical advice in Queensland's electrical safety laws, and
- applying a risk management approach to electrical safety:
 - identify electrical risk
 - assess the risks
 - decide on risk treatment measures
 - implement risk treatment measures and
 - monitor and review the safety measures to assess their effectiveness.

Look up and live – look down and survive

Powerlines are located throughout Queensland. In some cases these powerlines carry very high voltages up to 330,000 volts.

⚠️ All powerline voltages are LETHAL.

You don't need to come into direct contact with powerlines to receive an electric shock as electricity can 'jump' or arc across air gaps. Electricity can also flow through objects which would commonly be regarded as poor conductors, e.g. trees or machinery. The chances of survival are low for anyone exposed to electricity from powerlines.

Powerlines are usually installed above ground, however powerlines may also be underground. To stay electrically safe it is essential to be careful and observe safe practices whenever you are near overhead powerlines or carrying out activities that penetrate the ground such as excavating trenches or drilling holes. Other electrical equipment like transformers mounted on power poles are also a risk so stay well clear.

**⚠️ Look up and live – look down and survive.
Dial 1100 before you dig. See page 10 for more information.**

Where to watch out for powerlines

Powerlines are often built beside roads or in corridors cut in forests or scrub. They can be near roads, homes, sheds, dams or gullies. Sometimes powerlines are difficult to see in the landscape. Locating them can be difficult even on bright sunny days and more so in low light, in rain, cloudy weather, or at dawn or dusk.



Most powerlines sag between poles and can be as much as three or four metres below the cross-arms supporting them.

Most powerlines do not follow a direct line from the top of one pole to another. They sag between poles and can be as much as three or four metres below the cross-arms supporting them. This is where powerlines are most often accidentally contacted. Powerlines can also sway in the wind and sag as temperatures rise so what appears to be a safe working distance may later expose people or property to serious risks.

 **Remember – electricity can jump gaps.**

Avoiding powerlines, poles and stay wires

The best way to stay safe when working around powerlines and other electrical equipment like transformers mounted on poles is to have a good working knowledge of the electrical safety laws and use safe work practices. The *Electrical Safety Codes of Practice 2010*, particularly *Working Near Exposed Live Parts* and *Electrical Equipment Rural Industry* provide valuable practical advice on how to stay safe.

You need to determine the height and reach of all machinery and plant used near powerlines and consider the way it is used to identify hazardous situations.

Plant and machinery such as irrigation pipes, grain augers, elevators, grain silos, cranes and excavators all have the potential to contact powerlines. For example, moving a grain auger in the elevated position may cause contact with overhead powerlines.

 **Always lower an auger or other machinery before moving it.**

Power poles on rural properties may be owned by an electricity distributor or privately owned. Have someone with appropriate skills and knowledge, such as a licensed electrical contractor, periodically check privately-owned power poles and associated hardware such as cross-arms for deterioration due to rot or white ants, e.g. every five years. If you suspect other power poles on or near your property may be unsafe report them to the local electricity distributor.

You should also become familiar with the layout of the overhead electrical system on and near your property and how far away you need to keep from these powerlines. Also make sure that equipment operators and workers are suitably trained and competent to ensure they carry out activities around powerlines in a way that is electrically safe.

Before work starts:

- Complete a risk assessment and put in place suitable safety measures. Refer to the *Electrical Safety Codes of Practice 2010*, particularly *Risk Management and Electrical Equipment Rural Industry* for information on risk management. Refer also to the *Electrical Safety Code of Practice 2010 – Working Near Exposed Live Parts*.
- Ensure equipment operators and workers are aware of overhead and underground powerline locations, specified exclusion zones and the height and reach of equipment being used.
- Be aware that the layout of powerlines may be changed by your electricity distributor.
- Be aware of powerline heights, e.g. are they sagging due to storm damage or have they been damaged by a vehicle?
- Be aware that powerlines can move due to factors such as wind and temperature and adjust work practices accordingly.
- Equipment operators and workers should be made aware of the clearances that must be maintained from powerlines, poles, stay wires, etc.
- Use highly visible ground markers to highlight overhead powerlines. Contact your electricity distributor for advice on visual markers.
- Establish aircraft landing strips and approach paths away from powerlines.



Keep all crops and vegetation well clear of power poles and stay wires.

- Keep all crops and vegetation well clear of power poles and stay wires. Contact your electricity supplier if you suspect that vegetation near powerlines or poles could expose people or property to electrical risk.
- Ensure no damage occurs to poles, stay wires and overhead powerlines when burning off.
- Ensure you have clearly defined emergency procedures and ensure all workers are familiar with them in the event of contact with electricity, e.g. place contact phone numbers and procedures on the sun visor of your vehicles.

Exclusion zones

Workers, machinery and other plant must be kept a safe distance from powerlines at all times. The exclusion zones under Queensland's electrical safety laws are the minimum safe distances to be maintained from powerlines in all directions – they are your safety envelope. Although these are the minimum safe distances, the best way to stay electrically safe is to maintain the greatest possible distance from powerlines.

The following are examples of the clearances that people, machinery and plant must maintain from powerlines.

Powerline voltage (1kV = 1000 volts)	Examples	Exclusion zone*
Up to 132kV	Low voltage and high voltage powerlines – usually on poles	3 metres
Between 132kV and 330kV	Powerlines usually on poles and towers	6 metres
Over 330kV	Powerlines usually on towers	8 metres

Note: The table above does not fully detail exclusion zone dimensions and other requirements. For further information refer to Part 4 of the **Electrical Safety Regulation 2002 and the **Electrical Safety Code of Practice 2010 - Working Near Exposed Live Parts**.*

Safe work practices

Safe work practices usually stem from good planning, consultation, training, local knowledge and suitable risk management practices.

The following practices can reduce electrical risk around powerlines in the rural industry.

- Always aim to stay further away from powerlines than the distance stipulated in the exclusion zone clearances – increasing distance from powerlines is a simple way to minimise electrical risk.
- Work away from powerlines – not towards them.
- Use maps or diagrams to show the location of powerlines and safe operating areas and keep these safety aids up-to-date.



Always lower machinery before relocating it.



Always lower machinery before relocating it.

- Carry out maintenance and check the height and reach of machinery well away from powerlines.
- Don't locate machinery or equipment under powerlines.
- Always use a safety observer whenever there is a risk of coming close to powerline exclusion zones – use a safety observer in each work team.

- Regularly monitor work activities around powerlines to ensure they are safe or whenever there is a change such as a new operator, machine or work activity. New operators need to be informed of your safety arrangements. New machinery could be bigger, e.g. longer spray booms, which needs to be factored in to your safe distances.



Long spray booms need to be factored in to your safe distances.

- The document *Managing Farm Safety – Risk Management – Electrical Hazard Checklist* provides practical advice and a template to help carry out a risk assessment. This material has been prepared by Farmsafe Queensland specifically for rural industry. It is available at www.farmsafe.com.au. Click on 'Industry solutions' to access the Electrical Safety document.

Dealing with fallen powerlines

If powerlines touch the ground there may be no sign of danger at all or there can be visible signs of danger such as sparks or arcing. A damaged powerline may also come to rest clear of the ground. The powerline could be draped across trees or rest on a metal or wire fence.

 **Treat all fallen powerlines as ‘live’ and a potential killer.**

Always keep well clear and contact your electricity distributor immediately so an emergency repair crew can be sent. Alert others to prevent them from approaching the fallen powerlines. Working or investigating a power outage around the property at night can be hazardous due to unseen fallen powerlines.

Contacting powerlines

Too often electrical incidents occur when someone or something contacts or comes too close to powerlines. This commonly involves an irrigation pipe touching a live powerline.

If a machine or vehicle comes into contact with powerlines follow the steps below.

- Stay calm and remain in the machine or vehicle until the power has been switched off.
- Do not attempt to get out of the vehicle as you risk being electrocuted by creating a shock path through your body to the ground as you exit.
- If another danger occurs such as fire and you must jump clear, keep both feet together, while landing upright, to prevent getting an electric shock from the energised ground around the machine. Then, still keeping both feet together, hop well clear of the machine.
- Call ‘000’ immediately to report powerlines are down and contact your electricity distributor to have the power switched off.
- Never approach, or allow others to approach, someone or something that has come into contact with powerlines, transformers and other electrical equipment as it likely that they will be electrocuted.

Irrigation hazards

Many electrical risks exist in day-to-day manual tasks in rural workplaces. Anyone who handles metal irrigation pipes while setting up a crop-watering system around powerlines may be at risk of contacting overhead powerlines.

A number of Queensland rural workers have been killed by tipping metal pipes on end to clear them without first checking the location of powerlines.

Look up and live.

When working with metal pipes near powerlines, don't lift them at right angles to the ground. Irrigation pipes are made in long lengths that easily cover the distance between the ground and overhead powerlines. Because of this, store irrigation pipes well away from powerlines.

When working near overhead powerlines place a few ground markers immediately under them. Have someone watch your movements so you don't move anything too close to the electrical risk overhead.

Train your workers and others to remember: see a marker – look up and live.

Underground electrical cables

Underground electrical cables are particularly hazardous as they are hidden from view. Under Part 4 of the *Electrical Safety Regulation 2002* employers or self-employed people in the rural industry must take certain steps to find out if underground electrical cables are at or near where work is to be done.

Before work starts.

- Use a service such as Dial **1100** Before You Dig. **Dial Before You Dig*** is available around Australia and provides advice about underground services including electrical cables.

***Note:** *Even if an information service such as Dial Before You Dig has been used, care must still be exercised as not all underground electrical cables are identified by such a service, e.g. privately owned underground electrical conductors.*

- Use advice about underground electrical cables such as location, type, depth and work restrictions to develop safe work practices.
- Whenever excavating watch out for warning signs of underground electrical conductors such as orange tape, conduits, sand or other markers.

Note: Due to changes in ground levels underground electrical conduits may not be at the required depth.

- If an underground electrical cable is encountered don't move it – contact your electricity distributor immediately and follow their advice.



Electrical equipment in rural industry

The *Electrical Safety Code of Practice 2010 - Electrical Equipment Rural Industry* gives practical advice about how owners and operators of rural businesses can manage risks associated with electrical farm equipment such as power tools, motors, pumps, fixed electrical installations and the activity of electric welding.

The *Electrical Safety Code of Practice 2010 - Electrical Equipment Rural Industry* provides the following ways of managing electrical safety obligations.

- Examine all specified electrical equipment in the workplace annually. Assess all electrical equipment, noting defects and arrange for them to be fixed.
- Assess whether there is electrical risk, including stated electrical risk factors (see page 12).

- Manage the stated electrical risk factors by:
 - assessing the risks and implementing risk treatment measures
 - using safety switch protection or regular testing and inspection
 - visually checking all electrical equipment prior to use or connection, and
 - continuing to monitor work areas and electrical equipment on an ongoing basis.

Stated electrical risk factor – a definition

Stated electrical risk factor means any of the following:

- use of plug-in electrical equipment in an unroofed area or wet area, e.g. a hose down area
- use of personally supported electrical equipment (handheld or carried) if the electricity supply cord is subject to flexing while the equipment is being used
- use of plug-in electrical equipment that is exposed to environmental factors that cause abnormal wear or deterioration, or
- electric light fittings located within arm's reach (2.5 metres upwards, or 1.25 metres sideways or downwards) and connected to a circuit rated at not more than 20 amps of current.

Examples of environmental factors that subject equipment to abnormal wear or deterioration include:

- corrosive or other damaging dusts, e.g. metal dust
- corrosive chemicals in the air.

Visual examination

Initially, you should visually examine electrical equipment to see whether power points, light fittings, switchboards, wiring and other electrical equipment appear to be undamaged and in operational condition.

If you find any problems, or suspect something is not electrically safe, a licensed electrical contractor or an employee who is a *licensed electrical person* are the only people permitted to fix the problems involving electrical work.

You should carry out this visual examination once every 12 months. You should pay particular attention to the following to see if there is any damage, or if the equipment has other readily apparent problems:

- switchboards
- electrical cables and conduits
- overhead powerlines
- power poles
- electrical accessories, such as power points
- other electrical equipment, such as light fittings, pumps or electrical cabinets
- handheld electrical equipment, such as electric drills or circular saws – these devices must be visually examined prior to connection to electricity.



Assess the electrical risk

Almost all rural workplaces will have stated electrical risk factors in one or more locations, e.g. if you use electrical equipment in a wet environment, or if you impose harsh wear on electrical equipment in your workplace, a stated electrical risk factor will exist.

Managing electrical risk

If work will involve stated electrical risk factors, the risk must be managed as follows.

- For work involving *specified electrical equipment*:
 - the equipment must be connected to a safety switch, or
 - it must be inspected and tested at least annually by a competent person. A competent person means a person who has acquired, through training, qualifications, experience or a combination of these, the knowledge and skill enabling the person to inspect and test electrical equipment.

- For the circuit supplying electric light fittings within arm's reach ensure it is protected by a safety switch.

Electrical risk must be managed by using safety measures identified by a documented risk assessment process. Refer to *Electrical Safety Code of Practice 2010 - Electrical Equipment Rural Industry*.

Specified electrical equipment – a definition

In rural industry work, specified electrical equipment means the following equipment:

- a cord extension set with a current rating of not more than 20 amps
- a portable outlet device with a current rating of not more than 20 amps
- electrical equipment, other than a portable safety switch, that
 - has a current rating of not more than 20 amps, and
 - is connected by a flexible cord and plug to low voltage supply.

Additional requirements

Electric welding work

Electric welding equipment must be visually inspected prior to use. To manage additional risks associated with electric welding, use the following measures:

- Electrode holders should be fully insulated – they should also be maintained to ensure a good electrical connection between the electrode and the holder.
- There should be a safe system of work in place for the performance of electric welding work. The safe system of work should address the electrical safety risks of electric welding.
- Personal protective equipment including protective clothing, gloves, footwear and eye protection must be used.
- In high risk situations such as in an enclosed space use a safe system of work. This would use safety measures such as a voltage reduction unit to lower the open circuit voltage of the welder to a safe level or a safety observer to watch over you and turn off the power when you change an electrode.

Hazardous areas

An area is considered hazardous if an explosive atmosphere is or may be present. Typical examples of hazardous areas are:

- petrol dispensing or decanting areas
- liquefied petroleum gas (LPG) storage and decanting areas
- areas in or adjacent to gas storage facilities
- ripening rooms
- grain silos (flammable dusts), and
- those where flammable products are stored, used, or decanted.

The best and simplest way of making sure a hazardous area is electrically safe is not to have any electrical equipment in it.

Never run an extension lead to a hazardous area to use plug-in electrical equipment. Even extra low voltage equipment such as battery drills should not be used in a hazardous area, because they can create electrical sparks and arcs which may initiate an explosion.

If it is essential to have electrical equipment in a hazardous area, you must ensure that:

- the hazardous area is classified by an expert person, establishing the type of hazardous atmosphere and its risk level, in accordance with recognised standards, and
- a licensed electrical person ensures that the electrical installation and equipment are suitable for the classification.

Test your safety switches regularly

A safety switch is only useful in protecting people if it operates instantly when an electrical fault occurs.

Safety switches can fail and get stuck in the ‘always on’ position and will not operate when an electrical fault occurs.

This failure may go undetected for some time. Failure to test the switch regularly means you don’t know if it still works or not. So the best course of action is to ensure you test your safety switch every three months.

Test if your safety switch is operating correctly by pushing the ‘test’ or ‘T’ button on the unit.

Teaching children

Teaching children about the danger of electricity is vital.

Education helps prevent accidents and ensures electricity does not represent a danger to children. Children by nature are inquisitive. They should be taught that electrical appliances, power points, cords and other electrical equipment are not play things.

Those who care for children should familiarise themselves with all electrical safety precautions.

- Supervise children closely when they are near electrical appliances or equipment.
- Find a secure place to store portable electrical appliances used in bathrooms and laundries.
- Ensure power points are covered when young children are around.
- Recreational activities such as climbing trees and flying kites or model planes can also become a risk around powerlines and other electrical equipment such as transformers mounted on powerpoles.



Be aware, and keep well clear.



For further information contact:

Electrical Safety Office

1300 650 662

Workplace Health and Safety Queensland

1300 369 915

Department of Justice and Attorney-General

www.electricalsafety.qld.gov.au

