

Electrical Focus

Checking and testing essential

Building and Energy wishes to remind electrical workers about the importance of properly checking and testing all installations.

On 10 June 2020, a North Perth electrical worker was ordered to pay more than \$27,000 in fines and costs for a transposition error by the Perth Magistrates Court.

The oversight led to two tradesmen receiving electric shocks.

The electrical worker was found guilty of breaching Electricity (Licensing) Regulations 49(1)(a) and 65 following a prosecution by Building and Energy.

He attended a property in Golden Bay, near Rockingham, on 25 August 2015 to transfer the kilowatt-hour supply tariff meter from a builder's supply to the new home's main switchboard as part of Western Power's Contractor Connect Scheme.

The court was told that the electrical worker tested the installation using a Metrel 2017 and filled out the associated Service Apparatus Test form. He affixed an installation test certificate inside the meter box and completed the Electrical Safety Certificate.

After the electrical worker left the property, a tiler and a gas fitter working on the house received electric shocks in separate incidents when they touched the main switchboard enclosure. The gas worker was briefly hospitalised but fortunately neither man was seriously injured.

A Western Power inspector found the active and neutral load conductors at the kilowatt meter's were connected in a red-black-red-black sequence (rather than the correct red-black-black-red or 'ANNA' sequence), causing the surrounding earthed metal components to become energised.



During the trial, the defence argued that the incorrect wiring could have resulted from vandalism or tampering by someone else after the electrician had left the site.

However, Magistrate Thomas Hall found there was no direct evidence of any third party having been in contact with the meter or removing a meter seal that had been fitted.

Continued on page 3

In this Issue

Guidelines for the safety of buildings near network operator assets	3
Responding to reports of a person receiving an electric shock or tingle.	4
Community battery storage system for the South West	4
Transportable structures – dongas	5
Transferring of electrical contractor licence numbers	5
Submission of notices to correct network operator	6
Recalled RCDs, RCBOs and circuit breakers	7
Choose the right RCD	7
Changes to temporary disconnections and reconnections	9
Connecting power safely	10
Dangerous wiring	10
Importance of final checking and testing	11
Prosecutions	11



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Continued from cover page

Magistrate Hall noted that, although the electrical worker was an experienced electrician, he failed a Contractor Connect Scheme audit one month after the incident.

His Honour said based on the facts, the only reasonable inference was that the electrical worker caused the transposition and failed to test the meter properly, resulting in electric shocks to two people.

“Fortunately, they were not seriously injured, but they could have been killed. That is why there has to be such strict regulation and requirements in relation to the industry,” His Honour said.

The electrical worker was fined \$5,000 and ordered to pay \$22,214 in costs.

In November 2017, Western Power pleaded guilty and was fined \$50,000 in relation to the same incident because the electrician was an authorised worker for the network operator. He has since been removed from the Contractor Connect Scheme.

It is essential for all electrical workers to take care and responsibility for their work and to carry out the prescribed tests.

The job is not done until all the required checks and tests are carried out and recorded diligently and methodically to comply with safety regulations.

Guidelines for the safety of buildings near network operator assets

Building and Energy has published new Guidelines for the safety of buildings near network operator assets.

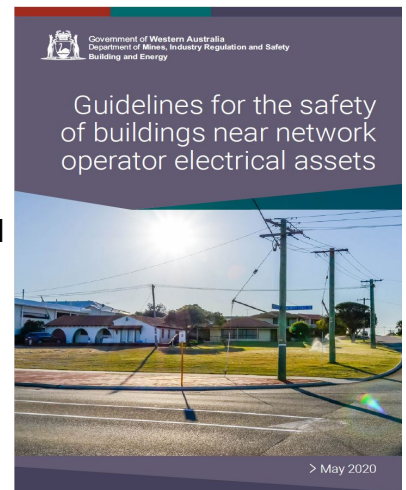
The Guidelines have been issued under Section 33AA of the *Electricity Act 1945*.

The risks and potential consequences of an electrical incident involving building encroachments too near network operator assets are significant,

especially for high voltage power lines. The danger justifies stringent safety design criteria for buildings to prevent injury to persons and major damage to electrical installations and buildings.

The guidelines have been produced to assist property owners, surveyors, planners, architects, builders, and local governments to give due consideration to safe clearances from network operator overhead and underground electricity infrastructure when designing and planning buildings, signs, and other structures.

The Guidelines can be downloaded from the [Building and Energy website](#).



Responding to reports of a person receiving an electric shock or tingle.

Under Regulation 63 of the Electricity (Licensing) Regulations 1991, a person, after becoming aware that an electrical accident has occurred, must report it immediately:

- to the relevant network operator; or
- if the person is unable to identify the relevant network operator, to Building and Energy.

If you are an electrical worker called to a property in response to a report of an electric shock, you should assume that no such report has been made. You should inform your customer that you will contact the network operator to arrange an urgent inspection and then do so immediately. This is the safe option and will be appreciated by the customer.

Under Regulation 253 or 254 of the Electricity Regulations 1947, network operators must investigate every shock report. They will do so promptly to determine the cause.

Some occupants are sensitive to the standing voltage appearing on the neutral conductor of the electricity supply, which must not exceed six volts. This voltage sometimes can be felt when touching shower taps for example. Other shocks may stem from static charge. The network operator investigator will identify these shock sources and reassure the building occupants that they are not dangerous.

Dangerous shocks can arise from broken or degraded neutral connections of the electricity

supply. Only network operators can check the condition of the supply neutral conductor and its connections. It is an essential first step that this source of shock be identified, corrected or proved not to be the cause.

The network operator's investigator will inform the occupants or owner if a fault is present in the electrical installation and they need to call a licensed electrical contractor. In such cases, the network operator may have to disconnect the electricity supply until the installation is fixed, especially if the shock victim had touched an exposed live part.

Community battery storage system for the South West

On 19 June, the State Government and the City of Busselton launched the South-West's first community battery storage system in Busselton.

The new utility-grade 464kWh Tesla battery will improve power quality and help upgrade the electricity network in the Busselton region.

The rollout of community batteries is a key action of the Distributed Energy Resources Roadmap, that was released in April 2020.

Integrating batteries into local communities improves the ability to balance neighbourhood load profiles during the day and allows more homes to install solar panels.

Located on Shovelboard Way, the Busselton battery is the fifth Western Power community battery, of this size, to be installed.

Other locations include Ellenbrook (Perth), Meadow Springs and Falcon (Mandurah), and Kalgoorlie.

Later this year, Synergy will offer eligible households the opportunity to store their excess solar energy in the community battery, allowing them to optimise their energy use without having to purchase their own household battery storage system.

Transportable structures – dongas

In many instances, dongas used for accommodation, office space and crib huts, or sea containers (fitted out as workshops or on-site storage) at construction or exploration sites are connected by plug and cord to socket outlets powered by portable diesel generators.

Licensed electrical contractors and electricians are reminded that such dongas must comply with AS/NZS 3001, Electrical Installations – Transportable structures and vehicles including their site supplies.

All internal switches and protective devices must operate on all active conductors (active and neutral). Where a donga, previously connected by fixed wiring, has been converted to plug and cord supply, the internal electrical installation must be checked to ensure this is the case. The switches and devices must be replaced with double-pole equivalents if necessary.

Dongas constructed for plug and cord connection must be manufactured to comply

with AS/NZS 3001. Transportable structures intended for connection by fixed wiring must comply with AS/NZS 3000, Wiring Rules.

Transportable structures can be deployed in a wide variety of locations and uses. Contractors and electricians need to carry out an assessment in each specific case to make sure their installation work complies with applicable standards. Possible examples include:

- transportable structure connected to an electrical installation by fixed wiring;
- transportable structure connected to an electrical installation by plug and cord;
- transportable structure connected to a generator by fixed wiring;
- transportable structure connected to a generator by plug and cord;
- multiple transportable structures connected together by plug and cord but primary power is by fixed wiring to an electrical installation or a generator;
- multiple transportable structures connected together by plug and cord but primary power is by plug and cord into an electrical installation or generator, and;
- multiple transportable structures connected together by fixed wiring but primary power is by plug and cord into a generator or electrical installation.

Transferring of electrical contractor licence numbers

On the 23 July 2020, the Electrical Licensing Board ceased the practice of transferring electrical contractor licence numbers.

Although this has been commonplace in the past, there is no provision in the Regulations which allows for the transfer of an electrical contractor licence number.

Licence numbers are issued as a unique identifier and so should a person, partnership or body corporate be required to apply for a new electrical contractor licence a new number will be issued.

By ensuring that each electrical contractor retains a unique identifier Building and Energy can more effectively monitor the activities of an electrical contractor as part of our commitment to safeguarding our community.

Submission of notices to correct network operator

On some jobs, it may be unclear where to send Preliminary Notices and Notices of Completion or whether they are required at all.

There are five network operators in Western Australia that receive notices, Western Power, Horizon Power, BHP Iron Ore, Rio Tinto Iron Ore and Peel Renewable Energy. In the absence of a network operator, notices are sent to Building and Energy.

Peel Renewable Energy Pty Ltd (PRE) is a new network operator distributing electricity by way of a renewable energy micro-grid to the Peel Business Park, Nambelup east of Mandurah. Electrical contractors performing installing work for clients within the business park must submit notices to PRE.

Other network operators

There are other network operators in WA who operate transmission networks and distribution networks. Where these networks are connected to either Western Power, Horizon Power, BHP Iron Ore, Rio Tinto Iron Ore or PRE, electrical contractors undertaking electrical works must submit notices to the respective network operator. Where electrical contractors undertake works on a network not connected to either of the five listed network operators, they must submit notices to Building and Energy.

Micro-grid projects will emerge in WA as the State further embraces renewable energy initiatives. These projects can exist as an embedded network within an existing network operator's network. Electrical contractors undertaking works on these projects will submit notices to the relevant network operator. Other micro-grids may exist as a separate network, similar to PRE, and will be established as a new network operator. When this occurs, Building and Energy will advise the industry of the new network operator.

Standalone power systems (SPS) utilising renewable energy are being installed across the State. These SPS's can be owned and operated by the private landowner or by one of the existing network operators. Electrical contractors installing or modifying SPS's for private landowners not connected to a network must submit notices to Building and Energy. Electrical contractors installing network operator owned and operated SPS's will need to confirm with the relevant network operator for the need to submit notices.

Recalled RCDs, RCBOs and circuit breakers

Electrical contractors are often engaged to carry out checks of electrical installations of homes about to be sold, rented or hired to make sure they comply with the RCD requirements of the Electricity Regulations 1947 and are safe. They certify that the installation complies or report shortcomings if it does not.

While carrying out these inspections, contractors may notice that the installation's main switchboard contains RCDs, RCBOs or circuit breakers that are subject to compulsory or voluntary recalls.

In such cases, electrical contractors should mention this in their reports to the client and recommend the recalled items be replaced with complying products.

Contractors should report such recalled items to their clients whenever they are noticed during the normal course of work. There is nearly always a serious safety issue justifying the recall.

In the course of an electrician's duties, it may become apparent an installation contains equipment which has been the subject of a recall. Examples of this may be a certain brand and model of RCD, RCBO or circuit breaker.

Where a recalled item is identified, Building and Energy encourages the electrical worker to discuss the situation with the property owner and advise them to have the item replaced.

If in doubt, a quick and simple check can be carried out at www.productsafety.gov.au/recalls.

Choose the right RCD

Electrical contractors must select and install the correct RCD for the equipment connected to a circuit.

When you select a RCD you must consider:

- the current waveform and possible waveform of fault current to earth;
- available types (Type A, Type AC, Type F or Type B); and
- the electrical equipment to be connected.

Under the Wiring Rules, you must check the guidance from equipment manufacturers to ensure a suitable RCD type is installed. Understanding the equipment being protected is critical. You may need to select a Type A, F or B rather than using the Type AC minimum protection.

Which type you choose will depend on the electrical equipment to be connected and requirements specified by the equipment manufacturer.

For general-use power circuits, consider using Type A (in place of the minimum Type AC required by AS/NZS 3000) to accommodate possible connection of electronics-based equipment. Similar considerations apply to items connected to lighting sub-circuits such as LED lighting and speed-controlled ceiling fans.

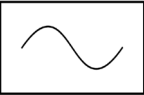

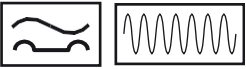
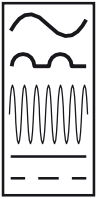

Incorrect RCDs are found all too often for solar PV inverters, battery storage inverters, uninterruptible power supply systems and power electronics-based loads (such as variable speed motor drives).

Further information about RCD selection can be found in:

- AS/NZS 3000:2018 Clauses 2.6.2.2.1, 4.12.5.2.2 and 7.3.5.2.2
- AS/NZS 4777.1:2016 Clause 5.4.4

Please refer to the table below for a quick guide on what type of RCD to use.

What type of RCD?

Type	Description	Use
AC 	Type AC RCDs are designed to operate when residual sinusoidal alternating currents are detected.	Resistive, capacitive, inductive loads.
A 	Type A RCDs are designed to operate on both residual sinusoidal alternating current and residual pulsating direct currents.	Circuits containing both AC and DC operated equipment with electronic components.
F 	Type F RCDs are designed to operate as per Type A, however can provide protection for composite residual currents and residual pulsating direct currents superimposed on smooth direct current.	Intended for the protection of circuits carrying high frequency leakage currents such as those associated with frequency converters and electronic ballasts- such as variable speed drives.
B 	Type B RCDs ensure tripping as described for type A RCDs as well as residual sinusoidal alternating currents up to 1kHz, residual alternating currents or pulsating direct currents superimposed on a smooth direct current of 0.4 times the rated residual current and residual direct currents that may result from rectifying circuits.	Three phase electronic equipment Application specific, such as solar inverters and electric vehicle charging.
S 	Type S RCDs are designed ensure tripping after a predetermined operating time delay corresponding to a given value of residual leakage current.	It is an optional higher residual current-rated RCD (100-300mA) installed upstream of final sub-circuit RCD protection (30mA or 10mA) to offer additional protection against fire ignited by leakage currents resulting from insulation breakdown.

Changes to temporary disconnections and reconnections

Western Power perform temporary disconnections at a customer's premise so that electricians can safely perform the required electrical work. Sometimes the disconnection is planned work, requested by the customer and in other cases it is because a fault has been identified at the property.

In April 2020, Western Power made some changes to the steps required after the electrical work is complete.

What this means for you

1. Western Power introduced a new Temporary Supply Disconnection tag. All the fields on the tag must be completed in full by the electrician before the power can be reconnected. The notice number must be included on the tag. Note: you do not have to have submitted the Notice of Completion to get the notice number. It can be located by saving a draft notice in eNotice and the notice number will be in the top left-hand corner.
2. You must submit a Notice of Completion. Under the Electricity Licensing Regulations 1991, you need to submit a Notice of Completion within 3 working days of completing the work.
3. Requesting a reconnection. This process has not changed.
 - For reconnection after a fault, contact 13 13 51.
 - For disconnection requested through a service request, contact the crew direct once you are ready for reconnection. Their contact number is on the temporary disconnection tag.
 - For major projects you will continue to work with your Project Network Officer (PNO) to arrange disconnection and reconnection.

western power

Temporary disconnection

Power to these premises has been disconnected by Western Power so that essential electrical work can be safely undertaken. Power will only be reconnected if all required information has been completed in the appropriate section of this tag by the Electrician doing the work.

The Electrician is still required to submit a Notice of Completion for any notifiable work undertaken.

*****For Non-Electrical work, please complete the reverse*****

Western Power to complete:

Location _____
Meter no. _____
Employee or contractor name _____ ID no. _____
Phone no. _____ Date & time _____
Reason _____

Electrical Contractor to complete:

Is the work you have undertaken notifiable? Yes No

Notice number: _____

The following work has been completed and is safe to be reconnected:

Certification of electrical installation work

I am not aware of any parts of the electrical installation that do not meet the requirements of the Electricity (Licensing) Regulations 1991.

- I am not aware of any parts of the electrical installation that are unsafe.
- The electrical work completed fully complies with the Wiring Rules.
- The electrical installing work completed is safe and ready to be energised.
- I confirm that I have carried out the checks and tests of this electrical installation as required by the Electricity (Licensing) Regulations 1991
- The connection and energisation of the premises is unlikely to cause any consumers' electric installations to become unsafe.
- I will ensure that a duly completed Notice of Completion for the electrical work is produced to Western Power within 3 working days. (Any breach of this regulation will be reported).
- I am aware that making a false statement may result in the suspension or cancellation of my electrical contractor's/worker's licence or other penalty.

Name (print) _____ EW licence# _____
Signature _____ Phone _____
EC name _____
EC licence# _____ Date _____

Callouts:

- Before contacting Western Power for a reconnection, ensure that the Notice number relating to your work is provided here
- Carefully read the above certification. Once satisfied, print your name and provide a signature to confirm the property is safe to reconnect
- If the property has been disconnected so that electrical work can be undertaken at the premise, then the work is notifiable, so tick "yes"
- Make sure you provide your workers licence and the contractor licence and the contractors name in this section

Connecting power safely

Network operators are reminded of the critical importance of making sure that every supply connection to customer premises is carried out correctly.

If a transposition occurs or a neutral connection is omitted the consequences could be potentially fatal for occupants. The severity of these consequences is often a matter of luck: no occupant touched a metallic surface; the house had wooden floors; or the person was wearing shoes with insulated soles. But then a person might touch a garden tap while standing on wet ground in bare feet.

Every network operator must have management systems and rigorous on-site procedures in place, backed by thorough training for both employees and any contractors engaged, to ensure service connections are properly done. Mandatory checks and tests must be completed and recorded.

Western Power was sentenced at Perth Magistrates Court on 13 May 2020 after pleading guilty to breaching WA's electricity regulations following a prosecution commenced by Building and Energy.

The network operator was fined \$75,000 and told to address "systemic failures" at management level after a connection error caused three homes to become energised with dangerous levels of electricity voltage.

It was fortunate that only equipment was damaged in this case, as someone could have

easily received a fatal electric shock from the dangerous conditions.

Dangerous wiring

Network operators increasingly are called upon to change revenue meters to accommodate solar PV installations in homes and for other reasons. They often rely on electrical contractors engaged to do this work or to install meters in new customer installations.

Again, such contractors are performing electrical work and must comply with all relevant safety regulations.

An electrical worker was fined \$15,000 for incorrect wiring causing parts of a home to become energised with dangerous levels of electrical voltage for 17 days.

Building and Energy's investigation revealed the electrical worker, employed by a Western Power contractor, transposed the load active and neutral conductors while installing a new tariff meter in the switchboard panel. This energised the home's earthing system, putting the occupants at risk of electric shock if they had made contact with metal components during the 17 days before the issue was discovered. The defective work by the electrician could have resulted in serious injury, or worse, for anyone at the property.

The electrician's failure to test the installation, despite falsely signing off on documents stating he had done so, is particularly concerning. A simple check would have immediately identified the fault.

Importance of final checking and testing

Network operators may engage licensed electrical contractors to carry out service connection work, including fitting revenue meters. While network operators must make sure the contractors are competent and have received appropriate training, such contractors also are responsible for making sure service connections are correct and safe. They are performing electrical work and must comply with the relevant requirements of electrical safety regulations when doing so.

Final checking and testing is an essential component of all service connection work. Contractors failing to do so are taking a serious risk.

An electrician was fined \$20,000 in the Joondalup Magistrates Court for a potentially deadly error that caused objects at a home to become energised with dangerous levels of electricity.

A Building and Energy investigation revealed that the licensed electrical worker, employed by a Western Power contractor, failed to reconnect the load neutral conductor at the three-phase supply tariff meter at the meter panel.

This caused metallic parts connected to the property's electrical earthing system to become potentially energised at 230 volts.

Prosecutions

Please visit Building and Energy's website to view the [Disciplinary and prosecution media releases](#).