

# electrical focus

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## Fault-loop impedance checks

Poor neutral connections, predominantly in older suburbs fed by overhead supplies, can contribute to persons receiving electric shocks. Experience has shown that the majority of shocks occur in 'wet areas' (eg. bathrooms, laundries) (refer article "Neutral voltage rise" in this edition of the Electrical Focus).

Electrical workers are encouraged to carry out a fault-loop impedance meter check on all electrical circuits when:

- the installation work is completed;
- checking and testing has been carried out; and
- power has been restored to the relevant circuits.

Energy Safety accepts that either an impedance measurement (using a fault-loop impedance meter) or an earth resistance measurement (using the running wire/ohm meter method) will satisfy the requirements to confirm continuity of the earthing system.

The benefits of using a fault-loop impedance meter include:

1. reduced time to confirm earth continuity;
2. accurate determination of the circuit fault loop impedance; and
3. a resultant safer installations – faults such as poor neutrals etc are more likely to be identified.

**A word of caution:** Like all instruments, the effectiveness of the results depends upon correct interpretation of the readings that are obtained. Table B4.1 of the Wiring Rules provides the **maximum** values of fault-loop impedance allowed for various circuit protection devices.

If the value indicated on the meter is **greater** than that documented at Table B4.1, then an investigation must be carried out to determine the reason. The high impedance reading may be from a poor supply authority neutral conductor/connection. One method that can be used to indicate where the problem may exist is to apply a fault loop test very close to the main switchboard. In this way, the probable source of the high impedance may be eliminated.

Other reasons for a high impedance value may be associated with the electrical installation, such as the MEN link not installed, incorrectly sized cables installed and poor connections.

Where the source of the high impedance can be attributed to the distribution network, the network operator should be notified.



## Energy Safety

## Carrying out assessments of existing installations

Recently, the Electrical Inspection Branch received a complaint regarding the quality of an electrical contractor's assessment and report associated with the purchase of a home. The purchaser of the dwelling requested the electrical assessment, as a condition of purchase, in conjunction with structural and plumbing inspections.

An electrical contractor was engaged by a building inspection company to carry out a visual assessment only, and provide a report. The visual assessment failed to identify all of the installation defects and the assessment report was not comprehensive or adequate for the intended purpose.

If a licensed electrical contractor is requested, and agrees, to carry out an electrical assessment on an existing installation for payment, it is recommended that a **comprehensive assessment and detailed report be produced that truly reflects the condition of the electrical installation.**

The Electrical Licensing Board considers that carrying out a comprehensive assessment or failing to provide an accurate report is unacceptable practice.

As a minimum, the electrical installation assessment should meet the visual and testing requirements as stipulated in Sections 1 and 6 of AS/NZS 3000:2000. The assessment should be carried out in accordance with Section 6 where the required visual assessment, including a useful checklist and tests that confirm compliance with the requirements of the Wiring Rules, are detailed.

The assessment report should contain sufficient detail to determine the state of the electrical

installation. This should include a description of each item checked and the associated test results of each item checked. It should also include **other relevant information regarding the condition of the installation, which would be of importance to any potential purchaser or user of the installation.**

'Other relevant information' includes:

- RCDs are installed and the areas they protect;
- VIR wiring is installed and if it requires replacement;
- unenclosed cable joints are present;
- MEN link is correct.

When assessing a premise, electricians need to be aware of the reporting requirements associated with a defective or unsafe installation.

Regulation 62 of the *Electricity (Licensing) Regulations 1991* requires that where it appears to an electrician that there is a defect in any electrical installation or electrical equipment that renders the electrical installation unsafe, the electrician shall immediately report the matter to:

- the owner or occupier of the installation;
- the relevant supply authority; AND
- the Director of Energy Safety ie. Energy Safety.

It is important that electricians do not leave defective work that is unsafe, as not only does this action put consumers at unnecessary risk, but it is also an offence against the regulations. Electricians should, with the knowledge/approval of the owner/occupier of the installation, make the installation safe and, where appropriate, minimise disturbing 'evidence' that may be required for further investigation.

## Neutral voltage rise

In normal electrical installations throughout the distribution system that use the MEN scheme, it is possible for the potential of the neutral conductor to rise above the earth reference potential, even though the neutral conductor is connected to earth at various points.

This may be due to one or more of the following:

- high resistance contact or open circuit in either the earth or neutral conductors at the MEN link;
- high resistance (or open circuit) supply neutral connection (ie. at the connection of the service cable to the street mains) causing excessive voltage drop in the neutral conductor;
- high neutral current due to large single phase and unbalanced multi-phase loads causing large potential differences in long distribution neutral conductors.

In conjunction with each of the above, where a high resistance contact of an earth electrode to the surrounding ground also exists (ie. relatively high impedance earth return path, which is normal for a typical consumer's installation, with a modest length of electrode installed in ordinary soil, as required by AS/NZS 3000 Wiring Rules), then the potential voltage rise of the neutral occurs. The concern then is that with the earth return largely nullified, the potential of the installation earth connections will rise in unison with the neutral voltage, effectively lifting all earthed devices of the installation to the higher neutral voltage. This may present a safety risk to the installation occupiers.

If the cause of the problem is related to the electrical installation, then it is the consumer's responsibility to have the matter corrected by an electrical contractor.

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If the cause of the problem is related to the supply conductors, for example, a high resistance neutral connection (not uncommon in the older suburbs), then the matter needs to be investigated and corrected by the network operator (supply authority). Contractors should not be reluctant to refer such cases to network operators such as Western Power for investigation and action, when they have assessed that the consumer's installation appears sound.

On a related matter, the Water Corporation provides some useful safety information for plumbers, including how to deal with electrical hazards when working on buried metallic water pipes, in its booklet "Earthing connections to electrodes and water pipes". This booklet is available from the website <http://www.watercorporation.com.au>.

The installation main earth conductor is connected to the buried metallic water pipes. Stray currents flowing in the buried metallic water pipes, arising from poor neutral connections or open circuits etc, cause potential voltage differences to occur along the metallic pipe. These voltages, which can be in the order of 10 to 15 volts, may present an electrical hazard to plumbers working on the water service.

## Carrying out electrical installing work for self

Energy Safety Inspectors have recently investigated instances where electricians (electrical workers) who have carried out electrical installing work at their own or relative's premises without first obtaining a permit to carry out this work, and who have had an electrical contractor submit a Notice for them (that is, an electrical contractor has submitted a Notice for work for which they were not responsible).

Electrical contractors are reminded that submitting a Notice of Completion for work for which they are not responsible is in breach of Regulation 54(1)(a) of the *Electricity (Licensing) Regulations 1991* and appropriate action will be taken against them.

Also, electricians [who are not electrical contractors] should be aware that they can obtain a permit (an exemption from the need to hold an electrical contractor's licence) to work on premises they own, lease or occupy, or for work on domestic premises owned, leased or occupied by immediate relatives, if they meet the following requirements:

- The electrician must be the holder of a current Western Australian "A" Grade electrical worker's licence endorsed "Electrical Mechanic" or "All Electrical Work".
- The immediate relatives must be

parents, son/daughter, brother/sister, grandparents, grandchild, farther/mother-in-law, son/daughter-in-law, brother/sister-in-law or husband/wife.

- The electrical installing work must not be carried out for monetary gain or reward.

Permits are available from Energy Safety's Licensing Office.

To obtain a permit for this scope of work, an electrician needs to submit a completed application form "Application to Carry Out Electrical Installing Work for Self or Immediate Family".

The application form must be accompanied by documentary evidence confirming proof of ownership of the property where the electrical installing work is to be carried out. Such proof may be the land title deed, building contract, rates notice etc.

The completed application form must be sent to the Licensing Office, Energy Safety.

Once approval is granted, a Preliminary Notice and Notice of Completion or Minor Work Notice will be provided to the electrician. The electrician will then submit the completed forms to the relevant network operator, as required.

The application form and a fact sheet are available from the Licensing Office and on Energy Safety's website.

## Replaced electrical worker licences

Details of licences that have been replaced due to being lost or stolen are provided to assist employers and others to maintain accurate records

### Replaced Electrical Worker Licences

Name	Previous Licence No.	New Licence No.	Grade	Date of Issue	Expiry Date
F Gidley	EW 102968	EW 133015	A	06/04/2004	18/09/2008
G Canning	EW 136412	EW 143831	A	09/03/2004	25/03/2008
R Dann	EW 124768	EW 124768	A	09/03/2004	14/07/2008
T Wilson	EW 142695	EW 143881	A	15/03/2004	13/01/2007
N Tran	EW 136640	EW 143939	A	17/03/2004	25/07/2008
N Johnston	EW 108107	EW 143982	A	19/03/2004	15/09/2008
N Nixey	EW 131929	EW 143985	A	19/03/2004	09/10/1985
P Young	EW 129908	EW 143864	A	19/03/2004	27/10/2008
K Sherrell	EW 109162	EW 144065	A	29/03/2004	27/03/2009

## Disciplinary action taken by the Electrical Licensing Board

1 February 2004 to 30 April 2004

The Electrical Licensing Board dealt with six operatives during this period.

### Competency Assessments

The following operatives had carried out substandard electrical work and were required to complete a competency assessment to demonstrate their knowledge and ability to carry out electrical work in a safe and satisfactory manner:

**Kim Elston (EW 134035)**<sup>1</sup>

**Bradley Hotker (EW 135120)**<sup>2</sup>

**Peter Loveless (EW 102686)**<sup>3</sup>

**Mark Berkelmans (EW 135320)**<sup>4</sup>

All failed an initial assessment and had their licences suspended.

<sup>1</sup> Mr Elston has been issued with a permit to work under the supervision of a licensed electrical worker whilst he undertakes the Electrical Trades Licensing Course.

<sup>2</sup> The electrical contractor's

licence in the name of Bradley Hotker's Electrics (EC 007109) was suspended until Mr Hotker proves his competence, as he was the only nominee.

<sup>3</sup> The electrical contractor's licence in the name of Top End Electrics (EC 004844) was suspended until Mr Loveless proves his competence, as he was the only nominee.

<sup>4</sup> The electrical contractor's licence in the name of Mark's Electrical Contractors (EC 006726) was suspended until Mr Berkelmans proves his competence, as he was the only nominee.

### Interview With the Board

#### Gregory Lawrence (EW 115219)

Mr Lawrence was interviewed by the Board to consider whether he was fit and proper to continue to hold an electrical contractor's licence. He was interviewed as a result of complaints received from his customers about the way he conducted himself.

The Electrical Licensing Board warned Mr Lawrence that he must act in a professional manner at all times when dealing with clients. Mr Lawrence has since informed the Board that he has sold his electrical contracting business and is no longer an electrical contractor.

### Warning Issued

#### Russell Brian Anderson (EW 104436)

Mr Anderson of Russell's Electrical Service (EC 000137) was engaged by an independent building inspection company to carry out a visual assessment of the electrical installation of a domestic premise. The inspection failed to fulfill the basic obligations of a licensed electrical contractor by not providing the client with a comprehensive assessment and a detailed report that truly reflected the condition of the electrical installation.

The Electrical Licensing Board issued a warning letter to Mr Anderson.

## Prosecutions for breaches of the *Electricity (Licensing) Regulations 1991* 1 February 2004 to 30 April 2004

Breach	Name (and suburb of residence at time of offence)	Licence No.	Fine & Court Cost (\$)
Carried out electrical work without holding an electrical workers licence Regulation 19(1) E(L)R	Jacob Paternostro (Clarkson)	EW 129760	2,277.50
Carried out substandard electrical work Regulation 49(1) E(L)R	Steven Baker (Innaloo)	EW 140821	1,837.30
Failed to submit a Notice of Completion for electrical work carried out Regulation 52(1) E(L)R	Exmouth Electrical Services Pty Ltd (Exmouth)	EC 004861	1,832.70
	FFE Building Services T/A JSE Group (Canning Vale)	EC 004183	977.00

E(L)R Electricity (Licensing) Regulations 1991

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