

<b>Title</b>	<b>Demonstrate knowledge of theory for registration of electricians</b>		
<b>Level</b>	<b>4</b>	<b>Credits</b>	<b>3</b>

<b>Purpose</b>	<p>This unit standard covers the theory assessment required for registration as an electrician. To achieve this unit standard, candidates must complete a competency-based programme of learning approved by the EWRB and must pass the EWRB Electrician Theory Examination, which is based on the requirements of the EWRB <i>Teaching Guidelines for Electrician</i>.</p> <p>People credited with this unit standard are able to demonstrate knowledge of:</p> <ul style="list-style-type: none"> <li>– basic electrical theory;</li> <li>– the New Zealand electricity systems of supply and the multiple earth neutral system;</li> <li>– electrical protective devices, personal electrical safety, physiological effects of electricity on the human body, electrical equipment isolation procedures, legislative requirements for workplace safety, and safe working practices;</li> <li>– the protection of electrical installations and equipment;</li> <li>– electrical transformers, their applications, and connections;</li> <li>– electrical cable selection;</li> <li>– switchboards and isolation devices;</li> <li>– basic electronics and semi-conductor devices;</li> <li>– the purpose and use of test instruments for, testing of installations, appliances, and fittings;</li> <li>– testing, inspection, and certification of electrical installations;</li> <li>– electric motors, motor starters, and motor selection and suitability of motor protection;</li> <li>– electric alternators;</li> <li>– prescribed electrical work requiring inspection; and</li> <li>– electric lighting.</li> </ul>
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<b>Classification</b>	Electrical Engineering > Electrical Standards and Statutes
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<b>Available grade</b>	Achieved
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<b>Entry information</b>
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Entry information	
<b>Critical health and safety prerequisites</b>	<p>For electrical installers, be working towards the New Zealand New Zealand Certificate in Electrical Engineering Theory (Level 3) [Ref: 3287]</p> <p>For electricians, be working towards the New Zealand Certificate in Electrical Engineering Theory and Practice (Trade) (Level 4) [Ref: 2388]; or demonstrate equivalent knowledge and skills.</p> <p>Before being assessed against this unit standard all candidates must have achieved unit standard 29484, <i>Demonstrate knowledge of theory and practice for electrical workers</i>.</p>

### Explanatory notes

- 1 This unit standard has been developed for learning and assessment off-job.
- 2 Under the Electricity Amendment Act 2006 the Electrical Workers Registration Board (EWRB) has a responsibility to set registration criterion for electrical workers and ensure that all persons applying for electrical registration are competent. As part of the competency requirements, 66 essential capabilities incorporating 31 critical items have been agreed between the EWRB and Australian licensing authorities.
 

3 To be eligible for registration as electricians, candidates must complete a competency-based programme of learning approved by the EWRB and must pass the EWRB Electrician theory examination, which is based on the requirements of the EWRB *Teaching Guidelines* available at [EWRB - Publications](#). The examination is the only valid assessment tool for this unit standard, and credit for this unit standard may only be granted on evidence of passing the examination. The EWRB *Teaching Guidelines for Electrician* is the main reference for this examination. Candidates must also achieve Unit 1702, *Demonstrate knowledge of, and apply electrical legislation, codes of practice, and standards*; credit for which will be granted on passing the EWRB Electrician Regulations examination. Candidates also need to pass the electrician three-stage practical skill assessment programme or an electrician practical examination. The examination prescription and practical skill assessments prescribed in the EWRB *Teaching Guidelines for Electrician* are structured around the essential capabilities and critical items that are considered relevant to electricians.
- 4 This standard, together with Unit 1702, *Demonstrate knowledge of, and apply electrical legislation, codes of practice, and standards*; satisfies the critical competencies component of the essential capabilities for registered electricians as specified by the EWRB.
- 5 Examination results will be notified by the EWRB.
- 6 Licensing class permission details are available on the EWRB website.
- 7 Definitions  
Act – the Electricity Act 1992.

*Code or ECP* – New Zealand Electrical Code of Practice issued under Part IV of the Act.

*Electrical appliance* – any appliance that uses, or is designed or intended to use, electricity, whether or not it also uses, or is designed or intended to use, any other form of energy.

*EWRB* – Electrical Workers Registration Board – the Board.

*Industry practice* – practice used and recommended by organisations involved in the electrotechnology industry.

*IP* – international protection ratings code.

*MEN* – multiple earth neutral.

*OSH* – occupational safety and health.

*PPE* – personal protective equipment.

*RCD* – residual current device.

*Regulation* – the Electricity (Safety) Regulations.

*SCR* – silicon controlled rectifier.

*Safe and sound practice* – this relates to the installation of electrical equipment and is defined in AS/NZS 3000:2007, *Electrical Installations (known as the Australian/New Zealand Wiring Rules)*.

*Section* – a section of the Electricity Act 1992.

*Servicing* – for the purposes of the EWRB registration classes "servicing" means: "any prescribed electrical work that involves the dismantling, repair, adjustment, reassembly of single-phase electrical appliances, other than the installation of permanently wired conductors, of works or electrical installations intended for the generation, conversion, transformation, conveyance, or control of electrical supplies".

*Supervision* – means that any trainee who is assisting with the carrying out of prescribed electrical work must be supervised under such control and direction to ensure that:

- (a) the work is carried out competently, and
- (b) while the work is being undertaken, appropriate safety measures are adopted, and
- (c) the completed work complies with the Electricity (Safety) Regulations 2010.

*Supervisor* – means a person, who holds a current practising licence issued by the EWRB that authorises the person to supervise prescribed electrical work.

*Trainee* – a person who is undergoing instruction or training in any class of prescribed electrical work for the purpose of obtaining registration as a registered person; and includes an apprentice who is working in the electricity industry who has uplifted a Trainee Limited Certificate.

Other terms and interpretations are defined in the Electricity Act, Electricity (Safety) Regulations, AS/NZS 3000: and the Companion Standards as prescribed in Schedule 2 of the Regulations.

## 8 References

AS/NZS 3000:2007, *Electrical Installations (known as the Australian/New Zealand Wiring Rules)*;

Electrical Workers Registration Board, *Supervision Procedures for Trainees*, (2010) available at [EWRB - Publications](#);

Electrical Workers Registration Board, *Teaching Guidelines for Electricians*, (2010);  
Electricity Act 1992;

Electricity (Safety) Regulations 2010;

and all subsequent amendments and replacements.

## 9 Range

- a All measurements are to be expressed in Système Internationale (SI) units and multipliers.
- b Material required for EWRB examinations is available at [EWRB - Material for Examinations](#).
- c Where candidates are required to solve questions that involve calculations specifically relating to selection of cables, extracts from the relevant Standard/s will be included in that examination paper.
- d All evidence presented for all of the outcomes and evidence requirements in this unit standard must be in accordance with legislation, codes of practice, and Standards listed in explanatory note 8; with industry practice; and with the EWRB *Teaching Guidelines for Electricians*.

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## Outcomes and evidence requirements

### Outcome 1

Demonstrate knowledge of basic electrical theory.

#### Evidence requirements

- 1.1 Present answers and explanations to questions relating to basic electrical theory.
- 1.2 Perform electrical calculations.

### Outcome 2

Demonstrate knowledge of the New Zealand electricity systems of supply and the multiple earth neutral system.

#### Evidence requirements

- 2.1 Present answers, explanations, and references to questions relating to New Zealand electricity systems of supply.
- 2.2 Present answers, explanations, and references to questions relating to the multiple earth neutral system.
- 2.3 Perform calculations relating to voltage and current and problems relating to the New Zealand electricity systems of supply and multiple earth neutral system are solved.

### Outcome 3

Demonstrate knowledge of electrical protective devices, personal electrical safety, physiological effects of electricity on the human body, electrical equipment isolation procedures, legislative requirements for workplace safety, and safe working practices.

#### Evidence requirements

- 3.1 Present answers, explanations, and references to questions relating to electrical protection, RCDs, isolating transformers, and personal electrical safety.

- 3.2 Present answers, explanations, and references to questions relating to physiological effects of electricity on the human body.
- 3.3 Present answers, explanations, and references to questions relating to electrical equipment isolation procedures, legislative requirements for workplace safety, and safe working practices.
- 3.4 Perform calculations and solve problems.
- Range electrical protective devices, personal electrical safety, and physiological effects of electricity on the human body.

#### **Outcome 4**

Demonstrate knowledge of the protection of electrical installations and equipment.

#### **Evidence requirements**

- 4.1 Present answers, explanations, and references to questions relating to the protection of electrical installations and equipment.
- 4.2 Perform calculations and solve problems.

#### **Outcome 5**

Demonstrate knowledge of electrical transformers, their applications, and connections.

#### **Evidence requirements**

- 5.1 Present answers, explanations, and references to questions relating to electrical transformers, their applications, and connections.
- 5.2 Perform transformer calculations and solve problems.

#### **Outcome 6**

Demonstrate knowledge of electrical cable selection.

#### **Evidence requirements**

- 6.1 Present answers, explanations, and references to questions relating to the selection of electrical cables.
- 6.2 Perform electrical cable selection calculations and solve problems using reference material provided by the examiner as required.

#### **Outcome 7**

Demonstrate knowledge of switchboards and isolation devices.

#### **Evidence requirements**

- 7.1 Present answers, explanations, and references to questions relating to switchboards and their requirements.
- 7.2 Present answers, explanations, and references to questions relating to switchboards and isolation devices.

### **Outcome 8**

Demonstrate knowledge of basic electronics and semi-conductor devices.

#### **Evidence requirements**

- 8.1 Present with the aid of diagrams, answers, explanations, and references to questions relating to basic electronic engineering and semi-conductor devices.
- Range semi-conductor devices – diodes, diacs, SCRs, thermistors, transistors, zener diodes, triacs; protection, operation, application, rectification.

### **Outcome 9**

Demonstrate knowledge of the purpose and use of test instruments for, testing of installations, appliances, and fittings.

#### **Evidence requirements**

- 9.1 Present answers, explanations, and references to questions relating to the purpose and use of test instruments, for testing of electrical installations, appliances, and fittings.
- Range insulation resistance tester, phase rotation meter, voltmeter ammeter, earth loop impedance tester, ohmmeter, RCD tester.

### **Outcome 10**

Demonstrate knowledge of testing, inspection, and certification of electrical installations.

#### **Evidence requirements**

- 10.1 Present answers, explanations, and references to questions relating to testing, inspection, and certification of electrical installations.

### **Outcome 11**

Demonstrate knowledge of electric motors, motor starters, and motor selection and suitability of motor protection.

#### **Evidence requirements**

- 11.1 Present answers, explanations, and references to questions relating to three-phase motor selection, applications, starting, and motor protection.

Range three-phase motor construction, three-phase induction motor principles.

11.2 Present answers, explanations, and references to questions relating single-phase motor selection, applications, starting, and motor protection.

Range single-phase induction motor operation, types of single-phase induction motors, speed control.

11.3 Perform motors and motor starting calculations and solve problems.

**Outcome 12**

Demonstrate knowledge of electric alternators.

**Evidence requirements**

12.1 Present answers, explanations, and references to questions relating to alternators.

12.2 Perform alternator calculations and solve problems.

**Outcome 13**

Demonstrate knowledge of prescribed electrical work requiring inspection.

**Evidence requirements**

13.1 Present answers, explanations, and references to questions relating to prescribed electrical work that requires inspection.

Range Electrical (Safety) Regulations 2010.

**Outcome 14**

Demonstrate knowledge of electric lighting.

**Evidence requirements**

14.1 Present answers, explanations, and references to questions relating to electric lighting.

Range includes but is not limited to – high intensity discharge, fluorescent, incandescent.

14.2 Perform calculations relating to lighting and solve problems.

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<b>Planned review date</b>	31 December 2019
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**Status information and last date for assessment for superseded versions**

Process	Version	Date	Last Date for Assessment
Registration	1	26 May 2005	31 December 2011
Review	2	19 June 2009	31 December 2011
Review	3	17 June 2011	31 December 2021
Review	4	21 July 2016	N/A

<b>Consent and Moderation Requirements (CMR) reference</b>	0003
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

**Please note**

Providers must be granted consent to assess against standards (accredited) by NZQA, before they can report credits from assessment against unit standards or deliver courses of study leading to that assessment.

Industry Training Organisations must be granted consent to assess against standards by NZQA before they can register credits from assessment against unit standards.

Providers and Industry Training Organisations, which have been granted consent and which are assessing against unit standards must engage with the moderation system that applies to those standards.

Requirements for consent to assess and an outline of the moderation system that applies to this standard are outlined in the Consent and Moderation Requirements (CMRs). The CMR also includes useful information about special requirements for organisations wishing to develop education and training programmes, such as minimum qualifications for tutors and assessors, and special resource requirements.

**Comments on this unit standard**

Please contact The Skills Organisation at [reviewcomments@skills.org.nz](mailto:reviewcomments@skills.org.nz) if you wish to suggest changes to the content of this unit standard.