Title	**Demonstrate knowledge of theory for registration of electrical installers**		
Level	**3**	**Credits**	**3**

Purpose	This unit standard covers the theory assessment required for registration as an electrical installer. People credited with this unit standard are able to demonstrate knowledge of: – basic electrical theory – the New Zealand electricity systems of supply and multiple earth neutral system – electrical protection and 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 – the protection of electrical installations and equipment – electrical transformers, their applications, and connections – electrical subcircuit cable selection – switchboards and isolation devices – basic electronic engineering and semi-conductor devices – the purpose and use of test instruments, testing of installations, appliances, and fittings – testing, inspection, and certification of electrical installations – electric motors, motor starters, and motor selection and suitability of motor protection – electric alternators – prescribed electrical work requiring inspection – electric lighting.

Classification	Electrical Engineering > Electrical Standards and Statutes

Available grade	Achieved

Critical health and safety prerequisites	Unit 29484, *Demonstrate intermediate knowledge for working in electrical trades* or demonstrate equivalent knowledge and skills.

Guidance Information

1 This unit standard may be used for learning and assessment off-job.

2 Under the Electricity Act 1992 the Electrical Workers Registration Board (EWRB) has a responsibility to set registration criteria for electrical workers and ensure that all persons applying for electrical registration are competent.

3 To be eligible for registration as electrical installers candidates must complete a competency-based programme of learning approved by the EWRB and must pass the EWRB Electrical Installer theory examination, which is based on the requirements of the EWRB *Teaching Guidelines for Electrical Installer*. 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 Electrical Installer* is the main reference for the examination.
Candidates must also achieve Unit 1702, *Demonstrate knowledge of electrical legislation*, *New Zealand 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's practical examination.
The examination prescription and practical skill assessments prescribed in the EWRB *Teaching Guidelines for Electrical Installer* are structured around the essential performance criteria that are considered relevant to electrical installers.

4 This unit standard, together with Unit 1702, *Demonstrate knowledge of electrical legislation*; *New Zealand Codes of Practice, and Standards*; and practical skill assessments satisfy the critical competencies component of the essential capabilities for registered electrical installers 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 References
AS/NZS 3000:(version as cited in the Electricity (Safety) Regulations), *Electrical Installations (known as the Australian/New Zealand Wiring Rules)*
Electrical Workers Registration Board, *Supervision Companion Guide* and other related publications available at https://www.ewrb.govt.nz/courses-and-exams/teaching-guidelines-and-resources/
Electrical Workers Registration Board, *Teaching Guidelines for Electrical Installer*, 12 July 2011 available at https://www.ewrb.govt.nz/courses-and-exams/teaching-guidelines-and-resources/
Electricity Act 1992
Electricity (Safety) Regulations 2010
and all subsequent amendments and replacements.

8 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.
Industry practice – those practices that competent practitioners within the industry recognise as current industry best practice.
Regulation – the Electricity (Safety) Regulations 2010.

SCR – Silicon Controlled Rectifier.
Safe and sound practice – this relates to the installation of electrical equipment and is defined in AS/NZS 3000.
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.
Other terms and interpretations are defined in the Electricity Act 1992, The Electricity Amendment Act 2006, Electricity (Safety) Regulations 2010, AS/NZS 3000 and the Companion Standards as prescribed in Schedule 2 of the Regulations.
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.
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 1992, Electricity (Safety) Regulations 2010, AS/NZS 3000 and the Companion Standards as prescribed in Schedule 2 of the Regulations.

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 https://www.ewrb.govt.nz/courses-and-exams/exams-and-practical-assessments/
- c Where candidates are required to solve questions that involve calculations specifically relating to selection of subcircuit cables, extracts from the relevant Standard/s will be included in that examination paper.
- d All evidence presented for assessment against this unit standard must be in accordance with:
  - i legislation;
  - ii policies and procedures;
  - iii ethical codes;
  - iv Standards – may include but are not limited to those listed in Schedule 2 of the Electricity (Safety) Regulations 2010;
  - v applicable site, enterprise, and industry practice; and
  - vi where appropriate manufacturers' instructions, specifications, and data sheets.

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of basic electrical theory.

Performance criteria

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 multiple earth neutral system.

Performance criteria

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 Demonstrate calculations relating to voltage and current, and solve problems relating to the New Zealand electricity systems of supply and multiple earth neutral system.

Outcome 3

Demonstrate knowledge of electrical protection and 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.

Performance criteria

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 Carry out 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.

Performance criteria

4.1 Present answers, explanations, and references to questions relating to the protection of electrical installations and equipment.

4.2 Carry out calculations and solve problems.

Outcome 5

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

Performance criteria

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 subcircuit cable selection.

Performance criteria

6.1 Present answers, explanations, and references to questions relating to selection of electrical subcircuit cables.

6.2 Perform electrical subcircuit cable selection calculations and solve problems using reference material provided by the examiner as required.

Outcome 7

Demonstrate knowledge of switchboards and isolation devices.

Performance criteria

7.1 Present answers, explanations, and references to questions relating to switchboards and isolation devices.

Outcome 8

Demonstrate knowledge of basic electronic engineering and semi-conductor devices.

Performance criteria

8.1 Present answers, explanations, and references, with the aid of diagrams, 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, testing of installations, appliances, and fittings.

Performance criteria

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.

Performance criteria

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.

Performance criteria

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.

Outcome 12

Demonstrate knowledge of electric alternators.

Performance criteria

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

12.2 Perform electric alternator calculations and solve problems.

Outcome 13

Demonstrate knowledge of prescribed electrical work requiring inspection.

Performance criteria

13.1 Present answers and explanations to questions relating to prescribed electrical work requiring inspection.

Range Electrical (Safety) Regulations 2010, AS/NZS 3000.

Outcome 14

Demonstrate knowledge of electric lighting.

Performance criteria

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

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

Planned review date	31 December 2028

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	17 June 2011	31 December 2020
Review	2	17 November 2016	31 December 2025
Review	3	28 March 2024	N/A

Consent and Moderation Requirements (CMR) reference	0003

This CMR can be accessed at http://www.nzqa.govt.nz/framework/search/index.do.

Comments on this unit standard

Please contact the Waihanga Ara Rau Construction and Infrastructure Workforce Development Council qualifications@WaihangaAraRau.nz if you wish to suggest changes to the content of this unit standard.