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| Title | Demonstrate knowledge of electrical theory and legislation for electrical appliance servicepersons (endorsed) | | |
| Level | 3 | Credits | 7 |

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| Purpose | <p>This unit is not intended for use by electricians. It is designed to meet the requirements of the prerequisite course for technicians wishing to sit the EWRB written examination, which is a requirement for registration as an Electrical Appliance Serviceperson (EAS) (endorsed to disconnect and connect).</p> <p>People credited with this unit standard are able to:</p> <ul style="list-style-type: none"> – identify legislative documentation and organisations that have an impact on the work of EAS (endorsed) servicepersons; – demonstrate knowledge of the responsibilities and limitations of registered EAS (endorsed) servicepersons; – demonstrate knowledge of earthing of appliances and fittings; – demonstrate basic knowledge of the use of appliances and fittings in damp locations; – identify the special provisions applying to the use of electrical appliances in hazardous areas; – identify the special provisions applying to the use of electrical appliances in electro-medical treatment areas; – demonstrate knowledge of regulatory requirements and procedures for safety testing of electrical appliances; – demonstrate knowledge of circuit protection devices; – demonstrate knowledge of safeguards for protection from electric shock when using portable electric appliances; – demonstrate knowledge of single-phase flexible cords and fittings. |
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| Classification | Electrical Engineering > Electrical Appliance Servicing |
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| Available grade | Achieved |
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Guidance Information

- 1 This unit standard is intended for use by technicians for electrical engineering, electronic engineering or telecommunications programmes at certificate level, and has been developed for learning and assessment off-job.

- 2 Performance in relation to the outcomes of this unit standard must meet the needs at an introductory level of relevant competencies 6 to 11, 14, 22, 23, 31 and 38 of the 45 Essential Capabilities for Electrical Registration (May 21) as defined by the EWRB under the Rules of the Board.
- 3 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.
- 4 Achievement of this unit standard alone does not entitle trainees to legally perform prescribed electrical work without supervision. Until registered and licensed under the Electricity Act 1992, trainees are assisting, and must work under supervision when carrying out prescribed electrical work.
- 5 References
AS/NZS 3000:2007, *Electrical Installations (known as the Australian/New Zealand Wiring Rules)*;
AS/NZS 3760:2010, *In-service safety inspection and testing of electrical equipment*;
AS/NZS 5761:2011, *In-service safety inspection and– Second-hand electrical equipment prior to sale*;
AS/NZS 5762:2011 *In-service safety inspection and testing – Repaired electrical equipment*;
Building Act 2004
Electricity (Safety) Regulations 2010 Schedule 2 Standards;
Electricity (Safety) Regulations 2010;
Electricity Act 1992;
EWRB *Teaching guidelines and resources* available at [Teaching guidelines and resources | Electrical Workers Registration Board \(ewrb.govt.nz\)](#);
Health and Safety at Work Act 2015
The New Zealand Electrical Codes of Practice (issued by Worksafe under section 36 of the electricity act 1993, ISSN 0114-0663) available at [Electrical codes of practice | WorkSafe](#);
Rules of the Board – as available at [Electrical Workers Registration Board \(ewrb.govt.nz\)](#);
and all subsequent amendments and replacements.
- 6 Definitions
CNG – Compressed Natural Gas.
EMI – electromagnet interference.
HRC – high rupturing capacity.
Industry practice – those practices that competent practitioners within the industry recognise as current industry best practice.
IP Codes – Ingress Protection Codes.
LPG – Liquid petroleum gas.
MIMS – Mineral Insulated Metal Sheath.
MOV – Metal oxide varister.
PEC – Protective earthing conductor.

- 8 Range
- a Candidates must refer to current legislation and Standards during assessment.
 - b All activities and evidence presented for all outcomes and performance criteria in 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

Identify legislative documentation and organisations that have an impact on the work of EAS (endorsed) servicepersons.

Performance criteria

- 1.1 Identify legislative documentation of importance to the work of EAS and EAS (endorsed) servicepersons.

Range Electricity Act 1992, Health and Safety at Work Act 2015, Building Act 2004, Electricity (Safety) Regulations 2010, AS/NZS 3000:2017, AS/NZS 3760:2010, AS/NZS 5761:2011, AS/NZS 5762:2011.

- 1.2 Identify the organisations that impact on the work of EAS and EAS (endorsed) servicepersons.

Range EWRB, WorkSafe, Electrotechnical Industry Associations.

Outcome 2

Demonstrate knowledge of the responsibilities and limitations of registered EAS (endorsed) servicepersons.

Performance criteria

- 2.1 Define the term 'supervision' in accordance with current legislation regulations, and Rules of the Board.
- 2.2 Explain the requirements for a person to be registered, licensed, or authorised in accordance with current legislation regulations, and Rules of the Board.
- 2.3 Define prescribed electrical work that a registered and licensed person may do, and identify limits and restrictions that the EWRB may impose upon such persons.

- 2.4 Identify the responsibilities of persons carrying out prescribed electrical work.
- Range responsibilities – compliance with legislation, Rules of the Board standards as they apply to the work undertaken, standard of workmanship, safe working practices.
- 2.5 Identify persons who may assist a registered person in carrying out prescribed electrical work.
- 2.6 Identify situations where the services of a person holding a higher class of registration may be required.

Outcome 3

Demonstrate knowledge of earthing of appliances and fittings.

Performance criteria

- 3.1 Explain the need to earth metal parts of Class 1 appliances and fittings with reference to earthing methods, protection provided under fault conditions, low resistance path of PEC, operation of protection devices, and fault current path.
- 3.2 State the maximum resistance permitted between the exposed metal of an appliance and the earth pin of the mains plug.
- 3.3 Explain the term equipotential bonding in terms of earthing and electrical safety.

Outcome 4

Demonstrate basic knowledge of the use of appliances and fittings in damp locations.

Performance criteria

- 4.1 Explain the term damp location in accordance with AS/NZS 3000:2017.
- 4.2 Explain why people and equipment require additional protection in damp locations in accordance with AS/NZS 3000:2017.
- 4.3 Identify the intent of the IP code, and state the degree of protection provided for given IP codes with reference to supplied chart.
- Range evidence of four examples is required.
- 4.4 Explain the importance of making like-for-like replacements of appliances in damp locations with reference to matching of IP ratings.
- 4.5 Identify methods of protection from electric shock when using appliances in damp areas.

Outcome 5

Identify the special provisions applying to the use of electrical appliances in hazardous areas.

Performance criteria

5.1 Define the term 'hazardous area' with reference to explosive atmospheres and identify the limits imposed in such areas.

5.2 Identify potentially hazardous areas.

Range petrol and CNG/LPG service stations, spray booths, petro-chemical plants, oil platforms, coal mines, flammable materials stores, laboratories; evidence of three is required.

5.3 Identify the need for specialist training prior to performing disconnection or connection, repair or maintenance of appliances used in explosive atmospheres.

Outcome 6

Identify the special provisions applying to the use of electrical appliances in electro-medical treatment areas.

Performance criteria

6.1 Identify electro-medical treatment areas.

Range body protected electrical areas, cardiac protected electrical areas, patient treatment areas.

6.2 Identify the regulations and standards relating to the appliances used as electro-medical devices.

6.3 Identify the need for specialist training prior to performing disconnection, or connection, repair, or maintenance of appliances used as electro-medical devices.

Outcome 7

Demonstrate knowledge of regulatory requirements and procedures for safety testing of electrical appliances.

Performance criteria

7.1 Identify the circumstances under which appliances must be tested.

- 7.2 Describe the tests to be carried out and state the required result.
- Range visual inspection, PEC continuity, insulation resistance, correct circuit connections, RCD, earth fault loop, polarity.
- 7.3 Identify the test instruments and range to be used for each type of test.
- 7.4 State the test voltages required for insulation resistance tests for given appliances.
- Range MOV protected appliance, EMI filtered appliance, Class 1 appliance, Class 2 appliance, appliance with MIMS element.
- 7.5 State the purpose of an insulation resistance test.
- 7.6 Describe the appropriate actions to be taken following testing for compliant and for non-compliant appliances.

Outcome 8

Demonstrate knowledge of circuit protection devices.

Performance criteria

- 8.1 Describe the effects of electrical faults in terms of the danger to people and property.
- Range faults – leakage current, over current, short circuit; effects – electromechanical energy, heat energy, damaged cables and equipment, fire, explosion, electric shock.
- 8.2 Identify circumstances leading to over current in an electrical circuit.
- Range circumstances – mechanical overload, phase to neutral fault, short circuit, phase to earth fault.
- 8.3 Explain the need for rapid and positive disconnection of faulty circuits.
- 8.4 Explain the operation of devices commonly used to provide protection against fault currents and state their advantages and limitations.
- Range devices – thermal protective devices, magnetic protective devices, rewirable fuses, cartridge fuses, HRC fuses, miniature circuit breakers, plug-in miniature circuit breakers.
- 8.5 Explain common terms used for fuses and circuit breakers.
- Range interrupt capacity, category of utilization, current rating, fusing current, tripping current, fusing factor, tripping factor, repairable, non-repairable, discrimination.

8.6 Explain the importance of using a replacement fuse or circuit breaker with the correct current rating with reference to the effects of under-rating and over-rating.

8.7 Explain the procedure to be followed if a fuse or circuit breaker operates a second time in response to the same fault.

Range leave circuit isolated at fuse or circuit breaker, apply tag, remove appliance from service and have it repaired, if necessary call an electrician.

Outcome 9

Demonstrate knowledge of safeguards for protection from electric shock when using portable electric appliances.

Performance criteria

9.1 State the means of protecting users from contact with live parts or when using portable appliances.

Range plastic and metal covers, double insulation, earthing, residual current devices, isolating transformers.

9.2 Explain the danger of using electrical appliances without proper earthing or insulation in earthed situations in the context of simultaneous contact with live parts and the earth.

9.3 Explain the essential features of double insulation as a means of protection with reference to how protection against electric shock is provided and how a double insulated appliance is identified.

9.4 Describe the construction, operation, and condition of use of safety devices for use with portable appliances and how they offer protection against electric shock.

Range residual current devices – operating time, residual current; isolating transformers – one appliance for maximum safety, interconnection of earth conductors when used with multiple appliances, use of other safeguards in conjunction with isolating transformer.

9.5 Explain the need for, and the nature of, periodic inspection.

Range residual current devices, isolating transformers.

Outcome 10

Demonstrate knowledge of single-phase flexible cords and fittings.

Performance criteria

10.1 Identify colours and related terminal abbreviations for conductors in single-phase flexible cords.

Range abbreviations – phase, active, line, neutral, earth.

10.2 Identify and select flexible cords for given single-phase applications.

Range applications must include but are not limited to – temperatures, presence of oil or petrol, and two others; given information – environment, length, maximum current or power of appliance; reference material may include – tables of conductor ratings, applications of flexible cords may be used.

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| Planned review date | 31 December 2027 |
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Status information and last date for assessment for superseded versions

| Process | Version | Date | Last Date for Assessment |
|--------------|---------|------------------|--------------------------|
| Registration | 1 | 14 December 2017 | 31 December 2024 |
| Review | 2 | 2 March 2023 | N/A |

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

Comments on this unit standard

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