

Title	Demonstrate knowledge of protection from the harmful effects of electricity		
Level	3	Credits	2

Purpose	<p>This unit standard is for use in the training of electrical technicians and service persons. It covers the basic principles of protection against the harmful effects of electricity arising from excess current, electric shock, and faults, and the special situations of damp and hazardous areas.</p> <p>People credited with this unit standard are able to:</p> <ul style="list-style-type: none"> - demonstrate knowledge of causes and effects of excess current in electrical circuits and means of protecting against excess current; - demonstrate knowledge of protection from electric shock; - demonstrate knowledge of earthing of appliances and fittings; - demonstrate basic knowledge of the use of appliances and fittings in damp areas; - identify the special provisions applying to the use of electrical equipment in hazardous areas; and - identify the special provisions for electro-medical treatment areas.
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Classification	Electrical Engineering > Electrical Service Technicians
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Available grade	Achieved
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Guidance Information

- 1 This unit standard has been developed for learning and assessment off-job.
- 2 Competency under this unit standard does not entitle the candidate to legally perform prescribed electrical work without adequate supervision until the candidate has been registered and licensed under the Electricity Act 1992.
- 3 References
 Electricity (Safety) Regulations 2010;
 Electricity Act 1992;
 Health and Safety at Work Act 2015, and associated regulations;
 New Zealand Electrical Codes of Practice available at
<https://www.worksafe.govt.nz/laws-and-regulations/standards/electricity-standards-and-codes-of-practice/>;
 and all subsequent amendments and replacements.

- 4 Unit 17802, *Replace fuses and plug-in miniature circuit breakers* and Unit 15855, *Demonstrate knowledge of circuit protection*, deal with circuit protection against excess current in greater detail.
- 5 Definitions
- Current regulations and standards* – refers to the requirements of the above legislation and standards, applied to the context in which the term is used.
- Electrical technicians and service persons* – for the purposes of this unit standard means, people who hold or who are working towards electrical registration as an Electrical Service Technician, Electrical Appliance Serviceperson (endorsed to disconnect and connect), or Electrical Appliance Serviceperson.
- IP Code (Ingress Protection)* – is a system for classifying the degrees of protection provided for electrical equipment.

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of causes and effects of excess current in electrical circuits and means of protecting against excess current.

Performance criteria

- 1.1 Circumstances leading to excessive current in an electrical circuit are identified, and the likely effects stated.
- Range circumstances – mechanical overload, phase to neutral short circuit, phase to earth fault current;
effects – overheating, fire, damage to equipment, arcing.
- 1.2 Commonly used devices to protect against excess current are identified and their operation explained in simple terms.
- Range devices – thermal cut-outs, rewirable fuses, high-rupturing capacity (HRC) fuses, circuit breakers.

Outcome 2

Demonstrate knowledge of protection from electric shock.

Performance criteria

- 2.1 Mechanical means of protecting users from contact with live parts are stated.
- Range plastic and metal covers, double insulation.
- 2.2 Earthing or double insulation requirements for all exposed metal parts are described.

- 2.3 The danger of using electrical appliances without proper earthing or insulation in earthed situations is explained in the context of simultaneous contact with live parts and the earth, and at least five examples of earthed situations are given with reference to current regulations and standards.
- 2.4 Safety devices for use with portable appliances are stated, together with explanations of how they offer protection against electric shock.
- Range residual current devices, isolating transformers.
- 2.5 The essential features of double insulated appliances are explained from the point of view of how protection against electric shock is provided.

Outcome 3

Demonstrate knowledge of earthing of appliances and fittings.

Performance criteria

- 3.1 The principle of earthing of metal parts of appliances and fittings is explained.
- Range reference must be made to – how the appliance is earthed, safety of personnel under fault conditions, need for low resistance of earth wires, operation of circuit protection devices.
- 3.2 With the aid of a diagram, the path of the fault current is traced for a phase to metal frame contact in an appliance.
- 3.3 The maximum resistance permitted between the exposed metal of an appliance and the earth pin of the mains plug is stated in accordance with current regulations and standards.
- 3.4 The term equipotential bonding is explained in terms of earthing and electrical safety, and with reference to current regulations and standards.

Outcome 4

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

Performance criteria

- 4.1 The need for special treatment in wet or damp areas is explained in terms of safety to people and equipment.
- 4.2 The term damp situation is defined in accordance with current regulations and standards.
- 4.3 The purpose of the IP code is stated, and the meanings of three given codes are interpreted with reference to supplied tables.

- 4.4 The concept of zones in damp areas is explained, with reference to the effect this has on the use of appliances and fittings.
- 4.5 The importance of matching IP codes when making like-for-like replacements of fittings is explained.
- 4.6 Methods of protection from electric shock when using appliances in damp areas are identified in accordance with current regulations and standards.

Outcome 5

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

Performance criteria

- 5.1 The term hazardous area is defined with reference to explosive atmospheres and the need for special precautions in the construction, installation, and use of electrical equipment.
- 5.2 Typical hazardous areas are identified.
- Range typical areas – petrol and CNG/LPG service stations, spray booths, petro-chemical plants, oil platforms, coal mines, flammable materials stores, laboratories; at least three are required.
- 5.3 The classifications of hazardous areas and of electrical equipment for use in hazardous areas are explained in simple terms.
- 5.4 The special requirements and procedures in relation to equipment, cabling, cable entry arrangements to fittings, and documentation are identified, and the need for special training on this equipment before attempting repair or replacement is stated.

Outcome 6

Identify the special provisions for electro-medical treatment areas.

Performance criteria

- 6.1 Electro-medical treatment areas requiring special attention are identified.
- Range areas – body protected electrical areas, cardiac protected electrical areas, patient treatment areas, patient location, medical and dental practices.
- 6.2 The regulations and standards relating to electro-medical areas are identified.

6.3 Special requirements and procedures for use in electro-medical areas are identified.

Range requirements and procedures relating to – installation of appliances, maintenance, testing, documentation, training, and certification.

This unit standard is expiring. Assessment against the standard must take place by the last date for assessment set out below.

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	25 November 2000	31 December 2013
Revision	2	3 April 2001	31 December 2013
Revision	3	19 May 2004	31 December 2013
Review	4	20 June 2006	31 December 2024
Rollover and Revision	5	20 September 2012	31 December 2024
Revision	6	15 January 2014	31 December 2024
Rollover and Revision	7	25 March 2021	31 December 2024
Review	8	2 March 2023	31 December 2024

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>.