

Title	Demonstrate knowledge of electric motor and generator construction and operation		
Level	3	Credits	2

Purpose	<p>This unit standard is intended for training and assessment of electrical workers and covers knowledge and application of electric electromagnetic production and management of electricity.</p> <p>People credited with this unit standard are able to:</p> <ul style="list-style-type: none"> – demonstrate fundamental knowledge of the nature of sinusoidal and non-sinusoidal alternating voltages and currents; – demonstrate knowledge of d.c. motors and generators; – demonstrate knowledge of a.c. generator types; and – demonstrate knowledge of prime movers.
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Classification	Electrical Engineering > Electrical Installation and Maintenance
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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 This unit standard and unit standard 25071 meet the assessment requirements of ERAC EPC 4;
This unit standard and unit standards 25072, 29445, and 29473 together meet the assessment requirements of ERAC EPC 7.
This unit standard and unit standards 25071, 25072, 29476, and 29477 together meet the assessment requirements of ERAC CEPC 8.
- 3 Definitions
a.c. – alternating current.
CEPC – Critical Essential Performance Capability.
d.c. – *direct current*.
EPC – Essential Performance Capability.
ERAC – Electrical Regulatory Authorities Council.
EWRB – Electrical Workers Registration Board.
Industry practice – those practices that competent practitioners within the industry recognise as current industry best practice.
MEN – multiple earth neutral.
RCD – residual current device.
RMS – root mean square.

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

4 Range

- a Candidates may refer to current legislation and Standards during assessment.
- b Demonstration of safe working practices and installation in accordance with *safe and sound practice* are essential components of assessment of this unit standard.
- c 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

Demonstrate fundamental knowledge of the nature of sinusoidal and non-sinusoidal alternating voltages and currents.

Performance criteria

- 1.1 Explain how sinusoidal voltage is generated using a simple model of a coil rotating in a permanent magnetic field.
- 1.2 Calculate sine wave instantaneous voltages at any instant given frequency, or period, and peak voltage.
- 1.3 Define terms relating to single-phase and three-phase sinusoidal waveforms.

Range peak, peak-to-peak, average for full and half wave, RMS, form factor.
- 1.4 Explain the concept of RMS and average values with reference to heating effect.

Outcome 2

Demonstrate knowledge of d.c. motors and generators.

Performance criteria

- 2.1 Identify d.c. machines components and outline their function.
- 2.2 With the aid of diagrams explain d.c. machine operation for permanent magnet and field wound stator.

2.3 Outline the differences between d.c. motors and d.c. generators.

Outcome 3

Demonstrate knowledge of a.c. generator types.

Range rotating armature, rotating field, polyphase.

Performance criteria

- 3.1 Identify a.c. generator components from physical inspection, drawings or photographs.
- 3.2 With the aid of diagrams describe generator construction.
- 3.3 Outline the relationship between the number of poles and the armature speed.

Outcome 4

Demonstrate knowledge of prime movers.

Performance criteria

- 4.1 Outline three different prime movers suitable for driving generators and give reasons for selection.

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	21 July 2016	31 December 2027
Revision	2	16 March 2017	31 December 2027
Review	3	25 May 2023	31 December 2027

Consent and Moderation Requirements (CMR) reference

0003

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