Title	**Demonstrate and apply knowledge of extra-low voltage requirements and testing for small scale renewable energy systems**		
Level	**4**	**Credits**	**15**

Purpose	This unit standard is for people who work with renewable energy systems and covers knowledge of regulations, standards and practices required for the safe and compliant installation of extra-low voltage installation requirements for small scale renewable energy systems. People credited with this unit standard are able to: – demonstrate knowledge of legislation and standards governing extra-low voltage work for renewable energy systems; – demonstrate knowledge of extra-low voltage installation requirements for renewable energy systems; – select extra-low voltage wiring and circuit protection for renewable energy systems; and – demonstrate and apply knowledge of renewable energy extra-low voltage installation testing.

Classification	Renewable Energy Systems > Renewable Energy Systems - Design

Available grade	Achieved

Guidance Information

1 This unit standard has been developed for learning and assessment off-job.

2 References
All references to Australian Standards (AS) may be found at www.standards.org.au;
All Australian/New Zealand Standards (AS/NZS) may be found at http://www.standards.org.nz/;
AS/NZS 5139:2019, Electrical installations - Safety of battery systems for use with power conversion equipment;
AS/NZS 3000:2018, Electrical installations (known as the Australian/New Zealand Wiring Rules);
AS/NZS 3010:2017, Electrical installations - Generating sets;
AS/NZS 4509.1:2009, *Stand-alone power systems - Part 1: Safety and installation*;
AS/NZS 4509.2:2010, *Stand-alone power systems - Part 2: System design*;
AS/NZS 5033:2021: Installation and safety requirements for photovoltaic (PV) arrays.
Electricity (Safety) Regulations 2010;
Electricity Act 1992;
and all subsequent amendments and replacements.

3 Definitions

a.c. – alternating current.
Current regulations and standards – in this unit standard this term is used to refer to the requirements of the above references.
d.c. – direct current.
Enterprise policies and procedures – those practices and procedures that have been promulgated by the company or enterprise for use by their employees.
Industry practice – those practices that competent practitioners within the industry recognise as current industry best practice.

4 Range

a All measurements are to be expressed in Système Internationale (SI) units, and where required, converted from Imperial units into SI units.
b Candidates shall be supplied by the assessor with formulae involving more than three quantities.
c Use of a calculator during assessment is permitted.
d All activities must comply with any policies, procedures, and requirements of the organisations involved.
e Laboratory and workshop safety practices are to be observed at all times.
f All activities and evidence presented for all outcomes and performance criteria in this unit standard must be in accordance with legislation, enterprise policies and procedures, ethical code, current regulations and standards, industry practice; and where appropriate, manufacturer's instructions, specifications, and data sheets.

5 It is recommended that candidates have been assessed against Unit 27433, *Demonstrate knowledge of renewable energy concepts and technologies*; and Unit 27439, *Demonstrate knowledge of photovoltaic technology*, prior to assessment against this unit standard.

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of legislation and standards governing extra-low voltage work for renewable energy systems.

Performance criteria

1.1 Explain regulations relevant to extra-low voltage wiring.

1.2 Explain technical standards and codes that apply to extra-low voltage work.

Outcome 2

Demonstrate knowledge of extra-low voltage installation requirements for renewable energy systems.

Performance criteria

2.1 Describe requirements for installation and segregation of extra-low voltage wiring and equipment.

2.2 Describe compliant methods for providing protection for extra-low voltage circuits.

2.3 Describe requirements for planning, selection, and installation of extra-low voltage equipment.

Outcome 3

Select extra-low voltage wiring and circuit protection for renewable energy systems.

Performance criteria

3.1 Identify extra-low voltage and low-voltage circuits in a stand-alone or grid connected renewable energy system and describe the regulatory restrictions regarding work at each level.

3.2 Describe earthing requirements for renewable energy systems for a given range of applications and environments.

3.3 Calculate extra-low voltage cable sizes for a renewable energy system in terms of voltage drops and cable current carrying capacity in accordance with AS/NZS 3000 and AS/NZS 4509.2.

3.4 Select d.c. circuit protection and isolation for a stand-alone renewable energy system in accordance with AS/NZS 3000 and AS/NZS 4509.2.

Outcome 4

Demonstrate and apply knowledge of renewable energy extra-low voltage installation testing.

Performance criteria

4.1 Describe testing and verification requirements for renewable energy system extra-low voltage installations in accordance with the Electricity (Safety) Regulations.

4.2 Conduct and document tests confirming the compliance and safety of a renewable energy extra-low voltage installation in accordance with the Electricity (Safety) Regulations.

4.3 Conduct and document annual inspection and testing of a renewable energy system extra-low voltage installation wiring and equipment, including tagging, in accordance with the Electricity (Safety) Regulations.

Planned review date	31 December 2026

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 July 2011	31 December 2020
Review	2	24 October 2019	N/A
Rollover and Revision	3	27 March 2025	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 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.