Title	**Install, commission and maintain stand-alone photovoltaic power systems**		
Level	**4**	**Credits**	**20**

Purpose	People credited with this unit standard are able to demonstrate skills to install photovoltaic systems for residential and small community applications. People credited with this unit standard are able to: – specify installation requirements for a stand-alone PV system; – mount a PV array on a roof in accordance with AS/NZS 4509 and AS/NZS 5033; – install and commission a stand-alone PV power system in accordance with AS/NZS 4509; – perform maintenance and troubleshooting on a stand alone PV power system in accordance with standards AS/NZS 4086.2, AS/NZS 4509, AS/ NZS 5033 and OSH guidelines.

Classification	Renewable Energy Systems > Renewable Energy Systems - Installation and Maintenance

Available grade	Achieved

Guidance information

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

2 References
All Australian Standards (AS) may be found at https://www.standards.org.au;
All Australian/New Zealand Standards (AS/NZS) may be found at http://www.standards.govt.nz;
AS/NZS 3010:2017 Amd 1:2020, *Electrical installations - Generating sets*;
AS/NZS 4777.1:2024*, Grid connection of energy systems via inverters, Part 1: Installation requirements*;
AS/NZS 4777.2:2020, *Grid connection of energy systems via inverters, Part 2: Inverter requirements (Includes Part 3 Grid Protection Requirements)*;
AS/NZS 3000:2018 Amd3: 2023, *Electrical Installations (known as the Australian/New Zealand Wiring Rules)*;
AS/NZS 5139:2019, Electrical installations - Safety of battery systems for use with power conversion equipment;
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; 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.
OSH – Occupational Safety and Health.
OSH guidelines – Occupational Safety and Health guidelines defined by the New Zealand Department of Labour for workplaces.
PV – photovoltaic.

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 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 27427, *Demonstrate and apply knowledge of extra-low voltage requirements and testing for small scale renewable energy systems*; Unit 27431, *Design photovoltaic power systems*; Unit 27432, *Demonstrate knowledge of photovoltaic arrays mounting requirements*; Unit 27433, *Demonstrate knowledge of renewable energy concepts and technologies*; Unit 27436, *Demonstrate and apply knowledge of stand-alone renewable energy system components and operation*; and Unit 27439, *Demonstrate knowledge of photovoltaic technology* prior to assessment to this unit standard.

Outcomes and performance criteria

Outcome 1

Specify installation requirements for a stand-alone PV system.

Performance criteria

1.1 Select locations for the PV array, inverters, batteries (if required) and other components at a given installation site in accordance with AS/NZS 4509 and AS/NZS 4086.2, client requirements and design documents.

1.2 Specify installation requirements for all system components to ensure correct operation, long life, safety and ease of maintenance consistent with AS/NZS 4509, AS/NZS 4086.2, AS/NZS 3000 and relevant OSH guidelines.

1.3 Pre-test all components of a PV system for correct operation.

Outcome 2

Mount a PV array on a roof in accordance with AS/NZS 4509 and AS/NZS 5033.

Performance criteria

2.1 Identify the type of roof construction and determine methods to ensure roof integrity and waterproofing.

2.2 Select a PV array frame which is appropriate for the roof type and tilt angle adjustments required.

2.3 Select and use a fixing method which is appropriate to the roof type.

2.4 Place flashing and other waterproofing measures in accordance with manufacturers' specifications.

2.5 Choose an appropriate array mounting method if the roof is non-north facing.

2.6 Determine array location and type of mounting in accordance with local environmental consent.

2.7 Perform all array installation activities in accordance with AS/NZS 5033, AS/NZS 4509 and OSH guidelines.

Outcome 3

Install and commission a stand-alone PV power system in accordance with AS/NZS 4509.

Performance criteria

3.1 Install batteries and other system components in suitable locations after accounting for any site constraints.

Range may include but is not limited to regulators, d.c. control board, monitors, inverters, blocking and bypass diodes.

3.2 Place wiring to minimise power losses due to shading when connecting PV modules in series.

3.3 Select a cable route from array to battery to minimise the route length.

3.4 Perform electrical installation for a stand-alone PV system in accordance with AS/NZS 4509.

3.5 Prepare as-built system electrical and component layout diagrams and user instructions.

3.6 Prepare start-up, shut-down and commissioning procedures in accordance with AS/NZS 4509.

Outcome 4

Perform maintenance and troubleshooting on a stand-alone PV power system in accordance with standards AS/NZS 4086.2, AS/NZS 4509, AS/ NZS 5033 and OSH guidelines.

Performance criteria

4.1 Identify safety hazards associated with gensets.

4.2 Perform maintenance procedures on gensets using safe work practices in accordance with OSH guidelines.

4.3 Perform periodic servicing on a genset.

4.4 Test a genset for correct operation.

4.5 Locate and remedy electrical faults within a PV array or in any other part of the system.

4.6 Specify maintenance requirements for a commercially available stand-alone power system battery in accordance with AS/NZS 4086.2 and AS/NZS 4509 and manufacturer's specifications.

4.7 Devise a maintenance schedule for a stand-alone PV power system.

4.8 Perform testing and maintenance tasks required for stand-alone PV systems in accordance with AS/NZS 4086.2, AS/NZS 4509, AS/ NZS 5033 and relevant OSH 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.