

Title	Install, commission and maintain grid-connected photovoltaic power systems		
Level	4	Credits	15

Purpose	<p>People credited with this unit standard are able to demonstrate knowledge and skills in installation, commissioning and maintenance of grid-connected photovoltaic power systems.</p> <p>People credited with this unit standard are able to:</p> <ul style="list-style-type: none"> – prepare to install a grid-connected PV system; – mount a PV array on a roof in accordance with AS/NZS 5033; – install and commission a grid-connected PV system; and – carry out maintenance on a grid-connected PV system.
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Classification	Renewable Energy Systems > Renewable Energy Systems - 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 in a workplace environment.
- 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.org.nz/>;

AS 4777.1:2005, *Grid connection of energy systems via inverters – Part 1: Installation requirements*;

AS 4777.2:2005, *Grid connection of energy systems via inverters – Part 2: Inverter requirements*;

AS 4777.3:2005, *Grid connection of energy systems via inverters – Part 3: Grid protections requirements*;

AS/NZS 1170.2:2011, *Structural design actions - Part 2: Wind actions*;

AS/NZS 1170.3:2003 Amd 2: 2017, *Structural design actions - Part 3: Snow and ice actions*;

AS/NZS 3000:2007, *Electrical installations (known as the Australian / New Zealand Wiring Rules)*;

AS/NZS 5033:2012: *Installation and safety requirements for photovoltaic (PV) arrays*; and all subsequent amendments and replacements.

3 Definitions

Current regulations and standards – in this unit standard this term is used to refer to the requirements of the above references.

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.

MPPT – maximum power point tracker.

OSH – occupational safety and health.

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 Use of a calculator during assessment is permitted.

c OSH procedures may include but are not limited to – work permits and clearances, hazard monitoring, evacuation procedures, plant and electrical isolation.

d 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.

e Three installations are required.

5 It is recommended that candidates have been assessed against Unit 27428, *Demonstrate knowledge of grid-connected photovoltaic system components, distributor requirements and metering*; Unit 27432, *Demonstrate knowledge of photovoltaic arrays mounting requirements*; and Unit 27444, *Demonstrate knowledge of requirements for connecting photovoltaic arrays* prior to assessment to this unit standard.

Outcomes and performance criteria

Outcome 1

Prepare to install a grid-connected PV system.

Performance criteria

- 1.1 Identify OSH safety risks and procedures and implement measures and best industry practices to mitigate risks.
- 1.2 Identify and consult with others involved in the installation and sequence the work according to specification.
- 1.3 Obtain tools, equipment and testing devices and check for correct operation and safety.
- 1.4 Confirm the suitability of a specification for a grid-connected PV system in accordance with AS/NZS 5033 and local body requirements.

- 1.5 Choose suitable locations for the PV array and other components at a given installation site in accordance with client requirements, design documents and building structure constraints.
- 1.6 Specify installation requirements for all system components to ensure correct operation, long life, safety and ease of maintenance.

Outcome 2

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

Range roof integrity/penetration, array frame, fixing, flashing, aesthetics.

Performance criteria

- 2.1 Identify the type of roof construction and suitable mounting methods to ensure roof integrity and waterproofing are maintained.
- 2.2 Choose an appropriate PV array frame for the roof type and determine correct tilt angle adjustments.
- 2.3 Use correct fixing methods appropriate for the roof type.
- 2.4 Correctly place flashing and other waterproofing measures.
- 2.5 Choose an appropriate array mounting method for the site.

Range environmental conditions, local body requirements.

Outcome 3

Install and commission a grid-connected PV system.

Performance criteria

- 3.1 Install system components in suitable locations after accounting for any site constraints.

Range may include but is not limited to – regulators/MPPT, monitors/internet access/data logging, inverters, battery storage, customer preference.
- 3.2 Specify and install grid protection/anti-islanding methods.
- 3.3 Install array wiring for series connections to minimise power loss through shading at a particular site.
- 3.4 Select cable routes to minimise route length.
- 3.5 Carry out electrical installation for a grid-connected PV system in accordance with AS 4777.1 and AS/NZS 5033 including required labelling.

- 3.6 Prepare as-built system electrical and component layout diagrams, cable size calculations to meet AS/NZS 5033, and user instructions document to meet user specifications.
- 3.7 Specify and carry out start-up, shut-down and commissioning procedures.

Outcome 4

Carry out maintenance on a grid-connected PV system.

Performance criteria

- 4.1 Perform checks to ensure array connections are electrically and mechanically sound.
- 4.2 Check array for hotspots using thermal imaging diagnostic equipment.
- 4.3 Perform electrical tests to confirm correct system operation.
- 4.4 Clean PV array modules in accordance with approved safety procedures.

Planned review date	31 December 2024
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Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 July 2011	31 December 2015
Review	2	17 July 2014	31 December 2020
Review	3	24 October 2019	N/A

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 The Skills Organisation at reviewcomments@skills.org.nz if you wish to suggest changes to the content of this unit standard.