



ADVICE ON DOCUMENTATION

Version 1, 15/03/23

PREFACE

About this document.

This advice document has been prepared by the Clean Energy Council (CEC) to assist industry in understanding the requirements of system documentation across all applicable standards for photovoltaic (PV), battery and stand-alone power system (SPS) installations.

This advice alone does not constitute a fully definitive set of rules and should be read in conjunction with existing relevant standards, codes, and network service provider rules.

The CEC have taken the liberty of amalgamating the requirements from relevant standards to best suit a concise overview.

While all care has been taken to ensure this advice is free from omission and error, no responsibility can be taken for the use of this information.

The CEC have created further tools to assist the industry. These tools can be accessed using the following link:

[CEC Advice | Clean Energy Council](#)

The CEC encourage feedback or requests for additional clarification of requirements using the following online form:

[Feedback | Clean Energy Council](#) (available from April 2023)

The CEC will continue to work with the Clean Energy Regulator (CER), state & territory electrical safety regulators and industry bodies to keep this document updated.

The performance of a reliable installation that fulfils system owner expectations requires both careful design and correct installation practice.

The objective of this advice is to:

- improve the safety, performance, and reliability of PV (photovoltaic), battery and stand-alone power systems.
- encourage industry best practice for all design and installation work.

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1. INTRODUCTION AND SCOPE

1.1 Scope and General

This document addresses the requirements for PV, battery and SPS system documentation as required by relevant Australian Standards:

- AS/NZS 3000
- AS/NZS 4777.1
- AS/NZS 5033
- AS/NZS 4509.1

The following advice will focus on System manuals, which must be provided to the system owner on completion of an installation.

The document breaks the requirements into:

- A common set of requirements across all PV, Battery and SPS installations.
- Additional requirements specific to PV, Battery and SPS installations.

1.2 References

Designers and installers of PV and battery systems should have access to the following standards, codes and guides when reading this document. This advice is designed to be read in conjunction with the documents listed below.

AS 1768	Lightning protection
AS/NZS 1170.2	Structural design actions, Part 2: Wind actions
AS/NZS 3000	Electrical installations [known as the Wiring rules]
AS/NZS 3008 (series)	Electrical installation – Selection of cables
AS/NZS 4509 (series)	Stand-alone power systems
AS/NZS 4777 (series)	Grid connection of energy systems via inverters
AS/NZS 5139	Electrical installations – Safety of battery systems for use with power conversion equipment
AS/NZS 5033	Installation and safety requirements for photovoltaic (PV) arrays

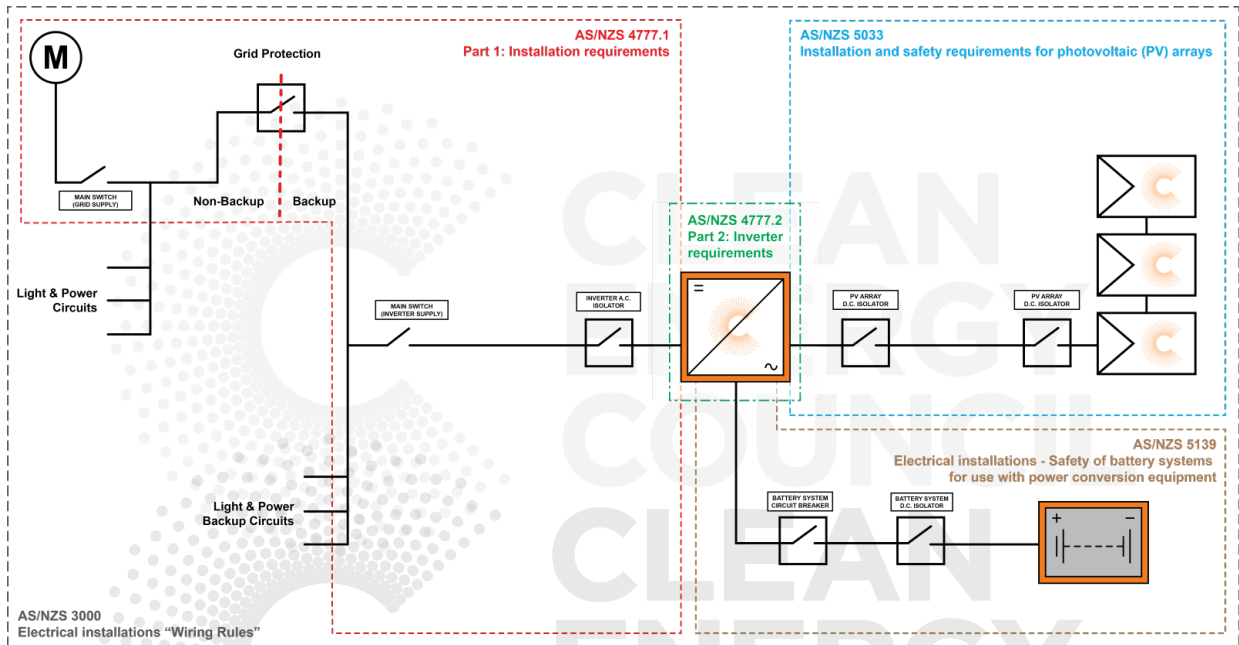
The system shall comply with the relevant electrical Codes of Practice, Service and Installation Rules (SIRs) for the state or territory where the system is installed.

The network service provider (NSP) may have additional requirements, including provision of documentation to enable connection to the grid.

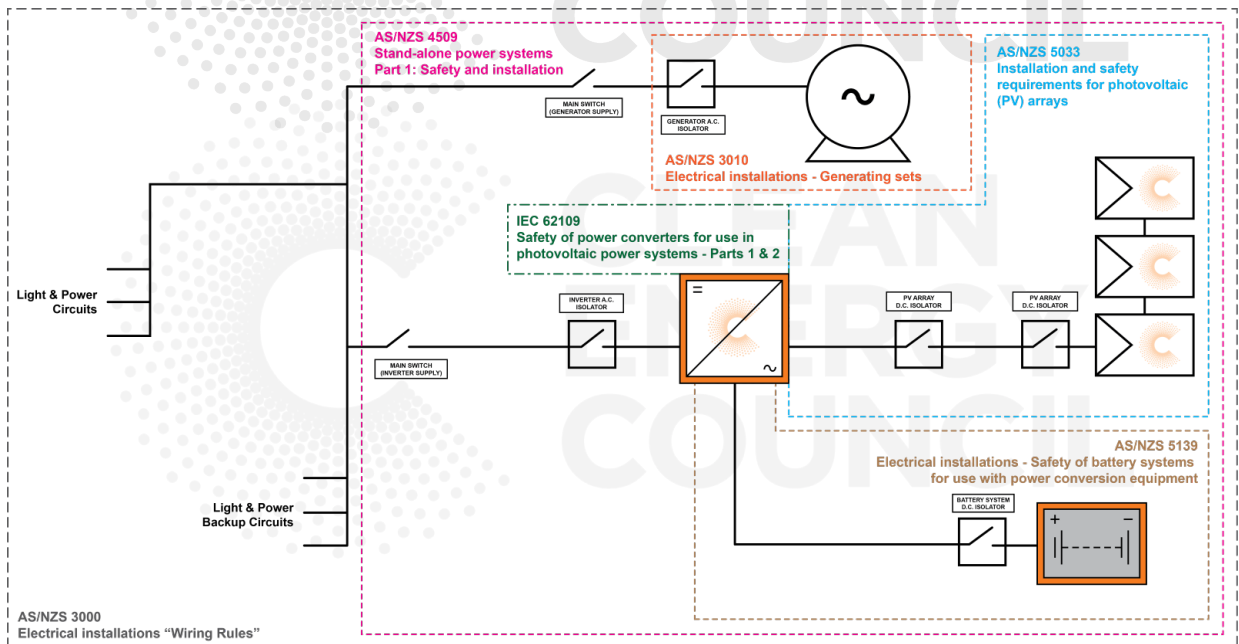
1.3 Application of Standards

The following diagrams provide a visual representation of the application of standards for:

Grid connected PV and Battery systems.



Stand Alone Power Systems.



1.4 Terms and Definitions

1.4.1 General

For the purpose of this advice document, the following definitions and those of AS/NZS 3000 apply. If no definition is given for a term, the definition given in Electropedia (also known as the “IEV” Online) applies. Electropedia is copyright material of the International Electrotechnical Commission and may be accessed through www.electropedia.org.

1.4.2 AS/NZS 3000 Definitions

1.4.2.1 available, readily

capable of being reached for inspection, maintenance, or repairs without necessitating the dismantling of structural parts, cupboards, benches, or the like.

1.4.2.2 shall

indicates that a statement is mandatory.

1.4.2.3 should

indicates a recommendation.

1.4.3 Additional definitions

In addition to definitions above, the CEC have added the following definitions to further assist the comprehension of this document.

1.4.3.1 common requirements

a set of requirements obtained from Australian Standards that are required for all PV, battery and SPS installations.

1.4.3.2 system manual

a complete document containing all required handover information to the client at the completion of an installation.

2. TECHNICAL CONTENT

2.1 System Documentation

2.1.1 General

At the completion of a PV, battery or stand-alone power system installation, a system manual shall be provided in accordance with the requirements specified in sections 2.1.2 and 2.1.3 below. The system manual should ensure that information is readily available to customers, inspectors, maintenance service providers and emergency service personnel attending the site.

2.1.2 Common Requirements

System manuals for all PV, battery or SPS installations shall include the following list of common requirements:

- A list of electrical equipment supplied, with model description and serial numbers.
- Operating instruction (system and components): a short description of the function and operation of all installed equipment.
- System connection diagram that includes the electrical ratings of the PV array, electrical connections of the battery system, and the ratings of all overcurrent devices and switches as installed.
- System performance estimate.
- Maintenance procedures and timetable
- Commissioning records and installation checklist – A complete record of the initial system settings at the time of system installation and commissioning checklists for quality assurance.
- Warranty information.
- Equipment manufacturers documentation and handbooks (data sheets and user manuals) for all equipment supplied. As a minimum the following shall be included, specific to your installation type:
 - Panels/PV modules
 - Mounting frame
 - Inverter/PCE
 - Isolators
 - Cable
 - Monitoring Devices
 - Charge controllers
 - Battery Energy Storage System (BESS)
 - Generator
- Start-up procedure and verification checks
- Shutdown and isolation procedure for maintenance and emergency that shall ensure safe de-energisation of the system.
- Procedure for verifying correct system operation and what to do in the case of a system failure.
- Contact personnel for installation queries and system support.

2.1.3 Additional Requirements

In addition to the common requirements of 2.1.2, the following shall be provided, depending on the system type being installed.

2.1.3.1 PV array specific requirements – AS/NZS 5033

In addition to the common requirements of 2.1.2, the following list shall be provided for all PV arrays.

- a. Basic system information including system rating and component ratings, commissioning date and equipment location.
- b. Response requirements for an earth fault alarm
- c. Disconnection device location and cable routing
- d. Details of wind and mechanical loading. Note 1: In order to meet AS/NZS 1170.2 requirements and to claim STC's, manufacturer's details and engineering certification shall be provided.

2.1.3.2 Grid connected inverter specific requirements – AS/NZS 4777.1

In addition to the common requirements of 2.1.2, the following list shall be provided for all grid connected PV systems.

- a. Voltage rise calculations or measurements including any assumptions as required in AS/NZS 4777.1
 - b. Details of any central protection installed, including devices, wiring and settings.
 - c. DRED wiring and DRMs connected, if implemented.
 - d. Export control including devices, settings, and wiring.
- Note 2: Where multiple IES and installed within one electrical installation, documentation should be clear consistent terminology.

2.1.3.3 Battery specific requirements – AS/NZS 5139

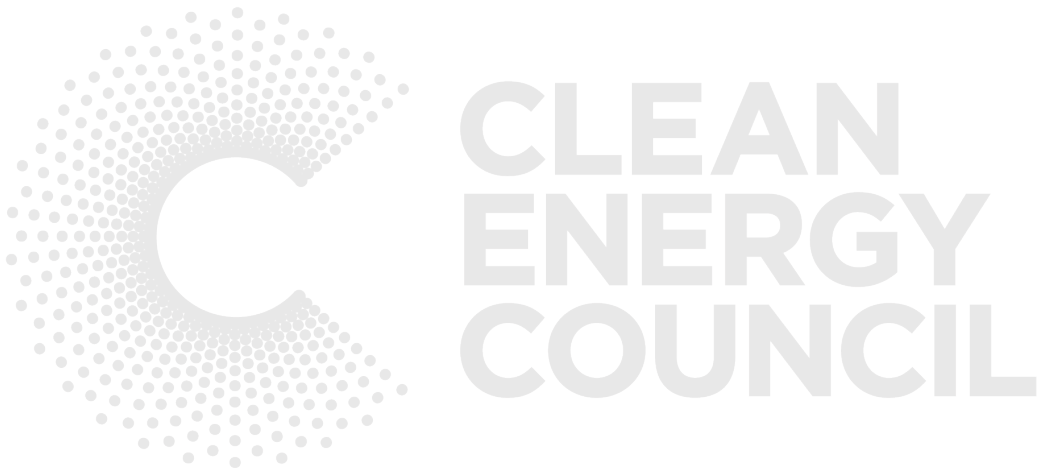
In addition to the common requirements of 2.1.2 the following list shall be provided for all battery systems:

- a. Battery system information including:
 - Total battery storage capacity
 - Australia/New Zealand address and contact details for the manufacturer representative or deemed equivalent.
 - UN number for the battery cell or battery system
 - Commissioning date
 - System providers contact details.
- b. Descriptions and meaning of any state of health measurements, where provided.
- c. Response requirements for any battery alarms
- d. A copy of the risk assessment undertaken, including information on specific requirements to address all risks, for example, the action to take when toxic fumes are present.
- e. List of any spare parts have been provided (e.g., fuse replacement cartridges).
- f. Decommissioning information for battery replacement or battery removal including safe handling procedures for the batteries and recommendations for recycling.

2.1.3.4 SPS Specific Requirements – AS/NZS 4509.1

In addition to the common requirements of 2.1.2, the PV array specific requirements of 2.1.3.1, and the battery specific requirements of 2.1.3.3, the following list shall be provided for Stand-Alone Power Systems:

- a. A system performance estimate, including an energy consumption table with both a.c. and d.c. loads, design load energy requirements, max and surge power demand, estimate of each renewable energy input showing expected seasonal variation and an estimate of generator run time.
- b. A copy of the initial energy usage estimate supplied by the customer and used to design the stand-alone power system.
- c. A logbook for ongoing recording of battery operating parameters, system parameters and servicing shall be provided.
- d. A separate logbook to record generating set maintenance shall be provided (when a generator is provided)



3. SUPPLEMENTAL ELEMENTS

3.1 Formats and Delivery Methods

There is little information provided in the Standards regarding acceptable methods for providing the required documentation.

Documentation including system manuals are required to be site specific and not one generic package for every job. System manuals shall be suitably protected to last the expected life of the system.

The CEC have compiled the following lists as best practice guidance for both the provision of documentation and ensuring you can prove compliance with requirements.

The CEC recommend two options for Providing documentation:

- Hard copy provided in a waterproof document wallet available inside the MSB or meter board.
- Electronic versions are acceptable (apart from AS/NZS 4509.1). This would allow a QR code to be used and other electronic formats.
NOTE: Electronic formats must remain available for the life of the system.

In order to prove compliance with this requirement, the CEC advises:

- Take a photograph of the documentation in its place of existence.
- Request a signature of receipt from the client stating they have received the documentation, understand the components and how the system works.
- Keep a record of all systems installed with the ability to provide another copy later if the customer requires it.
- Ensure that each site and location is assessed in the effort to have a durably lasting system manual available.

3.2 System Documentation Checklist

The CEC have compiled the following checklist to assist industry in ensuring that all the required documents are provided, and handover to the system owner can be verified.

PV array specific requirements – AS/NZS 5033
Basic system information including system rating and component ratings, commissioning date and equipment location <input type="checkbox"/>
Response requirements for an earth fault alarm <input type="checkbox"/>
Disconnection device location and cable routing <input type="checkbox"/>
Details of wind and mechanical loading. <i>Note 1: In order to meet AS/NZS 1170.2 requirements and to claim STC's, manufacturer's details and engineering certification shall be provided</i> <input type="checkbox"/>

System Documentation	
Common Requirements for PV, Battery & SPS	
Installation Address –	
Additional Documentation requirements -Select those relevant to the specific system type installed	<input type="checkbox"/> PV array – AS/NZS 5033 <input type="checkbox"/> Grid connected inverter – AS/NZS 4777.1 <input type="checkbox"/> Battery – AS/NZS 5139 <input type="checkbox"/> SPS – AS/NZS 4509.1
A list of electrical equipment supplied, with model description and serial numbers <input type="checkbox"/>	
Operating instruction (system and components): a short description of the function and operation of all installed equipment <input type="checkbox"/>	
System connection diagram that includes the electrical ratings of the PV array, electrical connections of the battery system, and the ratings of all overcurrent devices and switches as installed <input type="checkbox"/>	
System performance estimate <input type="checkbox"/>	
Maintenance procedures and timetable <input type="checkbox"/>	
Commissioning records and installation checklist – A complete record of the initial system settings at the time of system installation and commissioning checklists for quality assurance <input type="checkbox"/>	
Warranty information <input type="checkbox"/>	
Equipment manufacturers documentation and handbooks (data sheets and user manuals) for all equipment supplied. As a minimum the following shall be included, specific to your installation type:	<input type="checkbox"/> Panels/PV modules <input type="checkbox"/> Mounting frame <input type="checkbox"/> Inverter/PCE <input type="checkbox"/> Isolators <input type="checkbox"/> Cable <input type="checkbox"/> Monitoring Devices <input type="checkbox"/> Charge controllers <input type="checkbox"/> Battery Energy Storage System (BESS) <input type="checkbox"/> Generator
Start-up procedure and verification checks <input type="checkbox"/>	
Shutdown and isolation procedure for maintenance and emergency that shall ensure safe de-energisation of the system <input type="checkbox"/>	
Procedure for verifying correct system operation and what to do in the case of a system failure <input type="checkbox"/>	
Contact personnel for installation queries and system support <input type="checkbox"/>	

Grid connected inverter specific requirements – AS/NZS 4777.1
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Voltage rise calculations or measurements including any assumptions as required in AS/NZS 4777.1 <input type="checkbox"/>
Details of any central protection installed, including devices, wiring and settings <input type="checkbox"/>
DRED wiring and DRMs connected, if implemented <input type="checkbox"/>
Export control including devices, settings, and wiring. <i>Note 2: Where multiple IES and installed within one electrical installation, documentation should be clear consistent terminology</i> <input type="checkbox"/>

Battery Specific Requirements – AS/NZS 5139	
Battery system information including:	<input type="checkbox"/> Total battery storage capacity <input type="checkbox"/> Australia/New Zealand address and contact details for the manufacturer representative or deemed equivalent <input type="checkbox"/> UN number for the battery cell or battery system <input type="checkbox"/> Commissioning date <input type="checkbox"/> System providers contact details
Descriptions and meaning of any state of health measurements, where provided <input type="checkbox"/>	
Response requirements for any battery alarms <input type="checkbox"/>	
A copy of the risk assessment undertaken, including information on specific requirements to address all risks, for example, the action to take when toxic fumes are present <input type="checkbox"/>	
List of any spare parts have been provided (e.g., fuse replacement cartridges) <input type="checkbox"/>	
Decommissioning information for battery replacement or battery removal including safe handling procedures for the batteries and recommendations for recycling <input type="checkbox"/>	

SPS Specific Requirements – AS/NZS 4509.1
A system performance estimate, including an energy consumption table with both a.c. and d.c. loads, design load energy requirements, max and surge power demand, estimate of each renewable energy input showing expected seasonal variation and an estimate of generator run time <input type="checkbox"/>
A copy of the initial energy usage estimate supplied by the customer and used to design the stand-alone power system <input type="checkbox"/>
A logbook for ongoing recording of battery operating parameters, system parameters and servicing shall be provided <input type="checkbox"/>
A separate logbook to record generating set maintenance shall be provided (when a generator is provided) <input type="checkbox"/>

Installer Name:
Installer signature:
CEC accreditation number:
Date of installation:
Date of document handover:
System Owner Name:
System Owner Signature: