CLEAN ENERGY COUNCIL

ADVICE ON LABELLING

Version 2, June 2023

PREFACE

About this document.

This Advice document has been prepared by the Clean Energy Council to assist industry in understanding the labelling requirements across all installation types.

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.

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 would like to encourage feedback or requests for additional clarification requirements using the online form provided.

Feedback | Clean Energy Council

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 and keep accredited designers and installers updated to their requirements.

The objective of this advice is to:

- improve the safety, performance, and reliability of photovoltaic (PV) arrays
- encourage industry best practice for all design and installation work.

Where possible, this advice document has been written to align with relevant AS/NZS Standards.

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

Further tools to assist you to interpret the standard can be accessed via the installer login section of the website cleanenergycouncil.org.au/account/resources/solar-technical-information

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1 INTRODUCTION AND SCOPE

1.1 Scope and General

Summary

This document addresses the requirements for labelling across all PV and battery systems as required by the relevant Australian Standards:

- AS/NZS 3000
- AS/NZS 4777.1
- AS/NZS 5033
- AS/NZS 5139

This document will break the requirements into:

- Equipment marking requirements
- Application of labelling

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 5033	Installation and safety requirements for photovoltaic (PV) arrays
AS/NZS 5139	Electrical installations – Safety of battery systems for use with power conversion equipment

The system shall also 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 Terms and Definitions

1.3.1 General

Throughout this document, the definitions in AS/NZS 3000, AS/NZS 4777.1, AS/NZS 5033 and AS/NZS 5139 apply.

2 TECHNICAL CONTENT

2.1 Equipment marking requirements

2.1.1 General

PV and battery labels are required to meet certain standards in order to be durable for the entire life of the system. The requirements listed in 2.1.2 ensure that the labels used meet the compliance requirements for the specific system type.

NOTE – The following is an almalgamation of the requirements across the standards. Exact wording may differ from one standard to another.

2.1.2 Common requirements for labels and signs – AS/NZS 5033, 5139 & 4777.1

2.1.2.1 General

All labels and signs for PV and battery systems shall be:

- Sufficiently durable and designed to have a lifetime greater than or equal to the service life of the system
- Constructed of appropriate and durable materials suitable for the location
- Fixed in a durable manner appropriate for the location
- In English
- Legible and the letter size to be appropriate for the location (see 2.1.2.2)
- Indelible
- Visible where applicable (eg some signs may be enclosed in a switchboard cabinet, but visible when an operator opens the switchboard to perform maintenance or emergency services)
- Where installed exposed to direct sunlight conform to Appendix A

2.1.2.2 Sizing

The lettering on each sign should be 5mm for uppercase and 4mm for lower case per meter of viewing distance unless otherwise specified. The following labels have specific sizing requirements;

- ‘WARNING: HAZARDOUS d.c VOLTAGE’. The text shall have a minimum letter sizing of 10mm - AS/NZS 5033 Cl 5.5.1.2
- ‘WARNING: PV STRING DISCONNECTION POINT’. The text shall have a minimum letter sizing of 10mm - AS/NZS 5033 Cl 5.5.2.2
- Green ‘PV’ reflector sign must be at least 100mm in diameter – AS/NZS 5033 Cl 5.4
- Green ‘ES’ reflector sign must be at least 100mm in diameter – AS/NZS 5139 Cl 7.3
- ‘Danger, Risk of Battery Explosion’ sign must be at least 175mm x 175mm – AS/NZS 5139 Cl 7.8

2.1.2.3 Colours

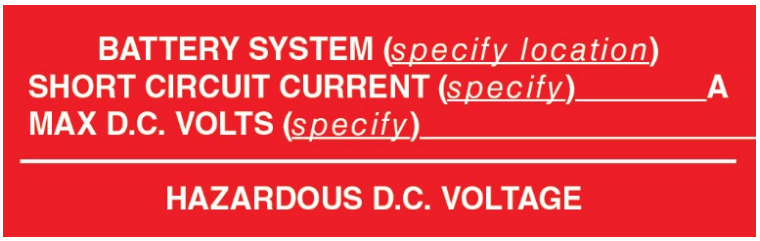
As a guide, the background colour and lettering colour should follow the principles listed below.

- Signs for general information should be **white and black** lettering

- Signs for essential safety of service personnel should be **yellow with black** lettering.

a. AS/NZS 5033 requires yellow and black labels applicable to the standard to also contain a **warning** symbol.

- Signs for attention of emergency personnel should be **red with white** lettering



- Signs for personal protective equipment as per AS/NZS 5139 should be **blue with white** contrasting colour

- Special signs as per AS/NZS 5033 and AS/NZS 5139 may use other colours

2.1.2.4 Where signage should not be implemented

In addition to the above requirements signs should not be-

- Obscured by being located inside cupboards, behind doors or other materials
- Located where they can be obscured by material placed in front of them or be located where it is likely that material will be placed in front of them (e.g. immediately above a shelf)
- Obscured by the door of the enclosure when in an open position
- Placing labels in places where they are not required can lead to confusion. Many label kits have additional labels outside of the requirements of your installation. This does not mean all of them are to be applied. Please ensure that only the required labels are applied.

2.2 Application of Labelling

2.2.1 Labelling flow chart

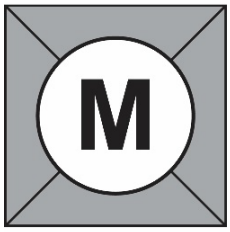
For Grid connected PV systems, the sections with no background colour may apply to your installation.

If your system also contains batteries, all of the following sections may apply to your installation.

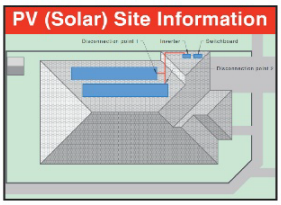
Please note, this is a comprehensive list of all possible labels that ***could*** be applied to a grid connected PV and/or Battery system, and the appropriate location.

It is the responsibility of the installer to determine which labels apply to their installation.

Meter Panel



Fixed on the outside of the Meter Panel and Main Switchboard and be readily visable to approaching emergency workers.
AS/NZS5033 clause 5.4.1

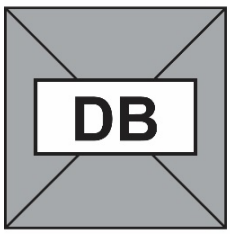


Fixed at the Main Switchboard and/or Meter Panel, Fire Panel.
AS/NZS5033 clause 5.6.1 & 5.6.1.1

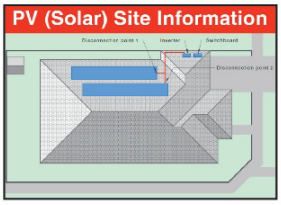
Below are additional labels for systems that contain batteries

Fixed adjacent to the main metering panel, and main switchboard as to be visible to approaching emergency workers. The label must display the relevant UN# for the battery chemistry.
AS/NZS5139 clause 7.3

Switchboards



Fixed on the outside of the Meter Panel and Main Switchboard and be readily visable to approaching emergency workers.
AS/NZS5033 clause 5.4.1



Fixed at the Main Switchboard and/or Meter Panel, Fire Panel.
AS/NZS5033 clause 5.6.1 & 5.6.1.1

Fixed adjacent the MAIN SWITCH for the grid supply.
AS/NZS4777.1 clause 6.2 (c)

Fixed adjacent the Main Isolator/s for the normal supply to the DB
AS/NZS4777.1 clause 6.2 (d)

Fixed adjacent the MAIN SWITCH for the IES.
AS/NZS4777.1 clause 6.2 (b)

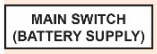
Provided in a prominent location on the switchboard where the inverter is not immediately adjacent to the switchboard.
AS/NZS4777.1 clause 6.2 & 6.4

Fixed at the Switchboard to which the IES is directly connected.
AS/NZS4777.1 clause 6.2 (a)

Fixed at the Main Switchboard and all intermediate distribution boards when the IES is connected to a distribution board.
AS/NZS4777.1 clause 6.3

Below are additional labels for systems that contain batteries

Fixed adjacent to the main metering panel, and main switchboard as to be visible to approaching emergency workers. The label must display the relevant UN# for the battery chemistry.
AS/NZS5139 clause 7.3



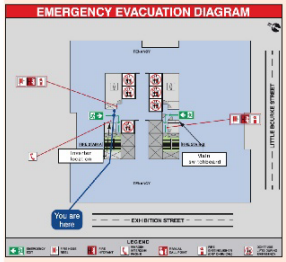
Fixed adjacent to the Main switch for the grid-interactive port of the multiple mode inverter.
AS/NZS4777.1 clause 6.2 (b)

Fixed adjacent to the Main Switch for the stand-alone port of the multiple mode IES.
AS/NZS4777.1 clause 6.11

Fixed adjacent to the Main Switch for the Battery System.
AS/NZS4777.1 clause 6.2 & 6.4

Fixed at the Main Switchboard and all intermediate distribution boards.
AS/NZS4777.1 clause 6.11

Fixed at the Main Switchboard.
AS/NZS4777.1 clause 6.5

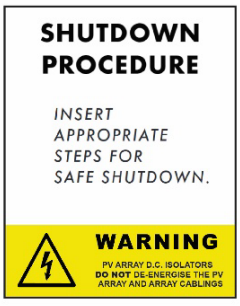


Fixed on Main Switchboard and/or Fire Panel when inverter locations are difficult to find or in large buildings.
AS/NZS4777.1 clause 6.3
AS/NZS5139 clause 7.4

Inverter

Fixed to AC isolator adjacent to inverter.
AS/NZS4777.1 clause 6.8 (a)

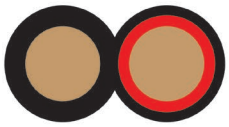
Fixed to DC isolator/s at the inverter.
AS/NZS 5033 clause 5.5.1 & 5.5.2.1



Fixed at the inverter.
AS/NZS5033 clause 5.7 & AS/NZS4777.1 clause 6.7

Fixed at DC isolators when multiple devices are used that are not ganged together.
AS/NZS5033 clause 5.5.2.1

Wiring system between Inverter and Array



WARNING
HAZARDOUS D.C. VOLTAGE

Fixed to array junction boxes containing PV DC cable terminations.
AS/NZS5033 clause 5.3.2

SOLAR

Fixed to the wiring system / wiring system enclosure where it is not directly behind and adjacent to the PV modules.
AS/NZS5033 clause 5.3.1.1

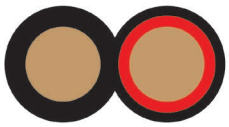
WARNING
HAZARDOUS D.C. VOLTAGE

Solar d.c. cables in conduit have been installed in this ceiling space. The conduit is labelled 'SOLAR' and care must be taken while working nearby. The internal solar d.c. cables may be live and must not be disturbed or damaged.

Where disconnection points have been utilised and cables run within ceiling spaces / accessible floor spaces, fixed to the access point.
AS/NZS5033 clause 5.3.1.2

NOTE: This label does not need to be applied to the visible surface of a ceiling or floor space access point. It can be located within the ceiling or floor space, adjacent the access point and clearly visible.

Wiring system between Inverter and Battery



Below are additional labels for systems that contain batteries

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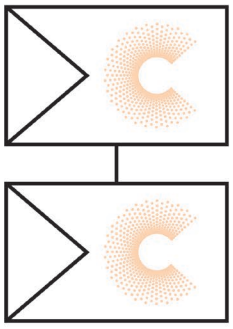
BATTERY

Fixed to battery cabling / battery cabling enclosure every 2m.
AS/NZS5139 clause 7.14

Array



PV ARRAY D.C. ISOLATOR

Fixed to Load Break Disconnector/s at the array
AS/NZS5033 clause 5.5.1 & 5.5.2.1

NOTE: AS/NZS5033 clause 5.5.1 also requires that Load Break Disconnectors are marked with an identification name or number consistent with the shutdown procedure.

WARNING
HAZARDOUS D.C. VOLTAGE

Fixed to array junction boxes containing PV DC cable terminations.
AS/NZS5033 clause 5.3.2

WARNING
PV STRING DISCONNECTION POINT

Attached to the PV module or structure within 300mm of the disconnection point.
AS/NZS5033 clause 5.5.2.2

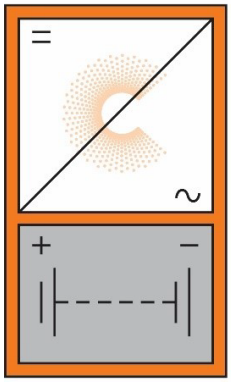
WARNING: LOADS MUST BE ISOLATED AND CIRCUIT MUST BE TESTED FOR THE ABSENCE OF CIRCUIT CURRENT BEFORE UNPLUGGING

WARNING: LOADS MUST BE ISOLATED AND CIRCUIT MUST BE TESTED FOR THE ABSENCE OF CIRCUIT CURRENT BEFORE UNPLUGGING

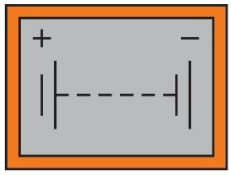
Attached to both the positive and negative cable within 100mm of the disconnection point.
AS/NZS5033 clause 5.5.2.2

NOTE: Although not a requirement, the CEC recommends marking disconnection points with an identification name or number consistent with the shutdown procedure. Similar to the requirement for Load Break Disconnectors under clause 5.5.1

Battery System



Section 4 BESS



Section 5 BS

Below are additional labels for systems that contain batteries

BATTERY SYSTEM
A.C. ISOLATOR

Fixed to AC isolator adjacent to BESS.
AS/NZS4777.1 clause 6.8 (b)

BATTERY SYSTEM
D.C. ISOLATOR

Fixed to the battery system isolation device in a prominent location.
AS/NZS5139 clause 7.12.2 *Note: See other clauses in 7.12 & 7.13.*

BATTERY SUPPLY
SHORT CIRCUIT CURRENT _____A
MAX D.C. VOLTS _____V

BATTERY SYSTEM (*specify location*)
SHORT CIRCUIT CURRENT (*specify*) _____A
MAX D.C. VOLTS (*specify*) _____
HAZARDOUS D.C. VOLTAGE

MULTIPLE BESS SUPPLIES
BESS # 1/4
SHORT CIRCUIT CURRENT ____A
MAXIMUM D.C. VOLTS ____V

Fixed adjacent to the enclosure or on all doors where the battery system is located.
For systems over DVC-A an additional line shall be added to the sign stating 'Hazardous D.C. Voltage'.
Where multiple battery systems are installed within one electrical installation, there shall be a sign for each battery system.
AS/NZS5139 clause 7.6

SHUTDOWN PROCEDURE

INSERT APPROPRIATE STEPS FOR SAFE SHUTDOWN

WARNING
BATTERY SYSTEM D.C. ISOLATORS DO NOT DE-ENERGISE THE BATTERY SYSTEM AND BATTERY SYSTEM CABLING

Fixed adjacent to the PCE to which the battery system is connected and adjacent to and visable from the equipment to be operated in the event of a shutdown.
AS/NZS5139 clause 7.16

WARNING
DO NOT DISCONNECT UNDER LOAD

Disconnectors for DVC-B & DCV-C systems and HRC fuse holders.
Fixed adjacent to or on each disconnector or HRC fuse holder.
AS/NZS5139 clause 7.12.4 and 7.13.3.

WARNING
MULTIPLE BATTERY SYSTEMS
TURN OFF ALL BATTERY SYSTEM ISOLATORS TO ISOLATE EQUIPMENT

Fixed adjacent to the PCE connected to the multiple battery systems.
AS/NZS5139 clause 7.12.3

DANGER
RESTRICTED ACCESS
WARNING

Where more than one sign is required at the same location they may be incorporated into one physical label.
AS/NZS5139 clause 7.2

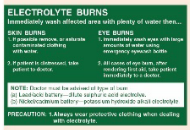
NOTE: Hazard labeling is specific to the the battery technology being installed, required labels must be identified as part of the Risk Assessment process required for all battery systems. See AS/NZS 5139:2019 Appendix G for further information.

Fixed adjacent to the enclosure or on all doors to the room where the battery system is located
AS/NZS5139 clause 7.5

Fixed adjacent to the enclosure or on all doors to the room where the battery system is located
AS/NZS5139 clause 7.5

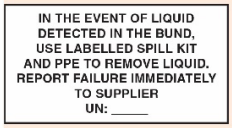
Fixed adjacent to the enclosure or on all doors to the room where the battery system is located.
AS/NZS5139 clause 7.8

Fixed adjacent to the enclosure or on all doors to the room where the battery system is located.
AS/NZS5139 clause 7.9



Fixed adjacent to the enclosure or on all doors to the room where the battery system is located.
AS/NZS5139 clause 7.10

Fixed adjacent to the enclosure or on all doors to the room where the battery system is located.
AS/NZS5139 clause 7.11



Fixed adjacent to the battery systems.
AS/NZS5139 clause 7.19

3 SUPPLEMENTAL ELEMENTS

3.1 Appendix A

3.1.1 UV Resistance

Labels/signs exposed to direct sunlight shall be UV resistant.

Labels/signs shall conform to the following tests specified in IEC 60068-2-5:2018

a. Ten samples of the markings shall be exposed for 720h to open-flame sunshine carbon-arc, in accordance with ISO 4892-4.
b. The test samples shall be mounted on the inside of the cylinder in the ultraviolet light apparatus perpendicular to the light source in such a way that the samples do no touch each other.
c. There shall be continuous exposure to light and intermittent exposure to water spray. The cycle shall consist of 102 min without water spray and 18 min with water spray. The apparatus shall operate with an open-flame sunshine carbon-arc lamp, borosilicate glass Type 1, inner and outer optical filters, a spectral irradiance of 0,35 W/m2 at 340 nm and a black panel temperature of (63 +/- 3) degrees C. The temperature of the chamber shall be (45 +/- 3) degrees C. The relative humidity in the chamber shall be (50 +/- 5)%.

Legibility of markings on equipment intended for outdoor use shall not be degraded by UV raditation.

EXCEPTION – This requirement does not apply to markings that are physically engraved, embossed or etched with durable markings.