



Electrical Focus

Notice of Completion required for obtaining the Small-scale technology certificates

Under the Electricity (Licensing) Regulations 1991, electrical contractors installing renewable energy systems must submit a Notice of Completion (NOC) to the relevant network operator for notifiable work within three days from the time the work was completed. This ensures the systems have been installed and certified in accordance with the relevant standards and legislation.

As of 24 December 2020, the Clean Energy Regulator requires the NOC, as well as the Electrical Safety Certificate be collected with the Small-scale Technology Certificate assignment form, before Small-scale technology certificates (STCs) may be created.

Failure to submit the NOC to the Clean Energy Regulator upon request may result in a delay or inability to issue STCs. You may wish to upload all three documents along with your claim in order to expedite processing. The Clean Energy Regulator website contains further information about [STC requirements](#).

Failure to submit the NOC may also result in enforcement action, including prosecution.

For further information about this change please visit the [Building and Energy website](#) or email be.energy@dmirs.wa.gov.au

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Solar installation and embedded generation

Tens of thousands of Western Australians are applying to network operators each year for permission to install solar Photo-Voltaic (PV) generation systems on their homes and commercial premises. The accumulative effect of having all these installations connected to the network makes solar the largest source of power generation in the State. Solar installations are also now the most common type of notifiable electrical work being carried out in Western Australia.

Over the past several years, Building and Energy has reminded industry that:

- The installation or upgrade of alternate forms of generation such as solar and wind and/or the installation of battery storage systems is notifiable work. This means that electrical contractors must submit a Notice of Completion to the network operator within three days of completion using eNotice.
- The work associated is classed as electrical work and must be completed by licenced electricians working for a licenced electrical contractor. The installation of roof brackets and rails can be installed by someone not holding an electrical licence but has been deemed competent by the electrical contractor they are employed by. The fixing and wiring of PV panels, DC isolators, cabling, earth bonding and all other associated work is electrical work.

Changes to the application for the Clean Energy Regulator's Small Scale Technology Certificates (STCs) – Notice of Completions to be provided.

Building and Energy works closely with the Clean Energy Regulator (CER) in Canberra to ensure solar installations comply with safety regulations. As of 24 December 2020, the CER requires Renewable Energy Certificate (REC) traders to obtain copies of the Notice of Completion as well as an Electrical Safety Certificate when applying for STCs.

Building and Energy Electrical Inspectors' Solar Campaign

Building and Energy has been actively looking into solar installations and commenced a number of investigations into breaches of legislation. These include, but are not limited to the following:

- failure to comply with an Inspector's Order;
- failure to submit a Notice of Completion;
- carrying out electrical work without a licence; and
- carrying on business as an electrical contractor without a licence.

Solar PV installations – DC isolators

For new solar PV installations, DC isolators must have the correctly rated enclosure for outdoor use. The enclosures must be IP56NW, or even IP66NW for situations exposed to particularly severe weather.

DC isolators installed in home solar PV systems must be certified and registered on the Electrical Equipment Safety System (EESS) national database: www.eess.gov.au.

The switches must bear the Regulatory Compliance Mark (RCM).



When installing DC isolators it is important to:

- Follow manufacturer's instructions
- Make sure the enclosure is sealed properly to maintain its IP rating
- Install an adequate shroud to protect the isolator and its enclosure against expected weather at the site and solar radiation
- Ensure all cables are installed with bottom entries to enclosures

It's a good idea to suggest to your customers that they arrange regular maintenance checks for their solar PV system.

Upgrading solar installations

Upgrading existing solar installations with larger panels and/or inverter is notifiable work. A Notice of Completion is required.

Such upgrades are not maintenance work, which comprises "repairing defective electrical equipment or replacing electrical equipment with electrical equipment having an equal or substantially similar engineering specification". An increase in panel or inverter capacity clearly is not maintenance.

The upgrading work also must comply with applicable current standards and the solar PV application and approval processes of the relevant network operator.



Solar PV installations - DC cable connectors

Since July 2012 it has been a requirement within solar installations to mate DC connectors with those of the same type from the same manufacturer.

AS/NZS 5033:2014 clause 4.3.7 - Plugs, sockets, and connectors:

Plugs, sockets, and connectors shall:

(k) only be mated with those of the same type from the same manufacturer.

Installing or certifying a solar system with mismatched DC connectors may be a breach under the Electricity (Licensing) Regulations 1991.

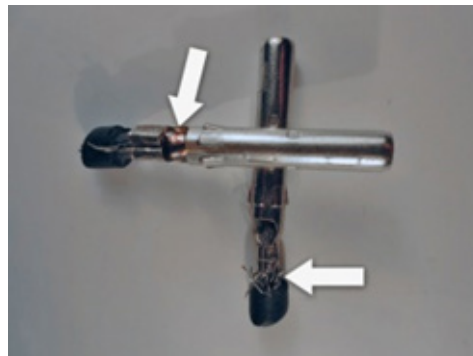
A mismatched DC connector failing can cause major damage, with a safety risk to occupants due to fire or smoke inhalation.

Investigations nationally show the cause of failure in many solar installations was the result of different brands of solar DC cable connectors mated together. The connections had failed and arcing started fires within the PV systems.

Electrical contractors need to make sure they use the same type from the same manufacturer and ensure the manufacturer-approved crimping tool is used for the connections.

Some failures have been caused by poor cable crimping, either by pliers or a non-approved crimping tool. The right tool will ensure the connection is crimped to the required pressure (Nm), as required by the manufacturer, to

ensure the connection is rated for the designed current carrying capacity.



Poorly crimped connection



Result of a poor crimp under the array.

The connectors carry significant DC energy. Correct crimping is essential. A poor joint can lead to arcing, which will continue unabated while the sun is shining.

Don't carry mis-matched connectors in your work vehicle!

Identifying mismatched DC connectors

Identifying mismatches can be difficult. Connector brands found with panels may look very similar. It is important to ask your supplier or check the panel specification sheet for the connector details.

To avoid mismatches, look at the:

1. 'O' ring on the male POS connector. Some have different colours and some have two 'O' rings. If the 'O' ring on your panel does not match the connector you are fitting, then it is probably a mismatched connector.
2. Screw nut on the cable gland at the end of the connector. The shape varies from brand to brand, this may be an indicator of a mismatched connector.
3. Contour of the body mouldings
Manufacturers use the same design on both the POS and NEG connectors, this is easily recognisable as a mismatched connector.

If in doubt, verify the connector by looking at the small manufacturer's logo or symbol on the connector body, if they match you can be sure they are from the same manufacturer.

Only connectors of the same type from the same manufacturer may be mated together. It is the responsibility of the licensed electrical contractor to ensure all connectors comply with this requirement.

*Article and images supplied by Energy Safe Victoria

DC Connector Examples



Red 'O' ring



Black 'O' ring



Logo 'TUV'



Logo MC4 brand

Examples of mismatched DC connectors



Different body mouldings and cable gland nuts



Different screw nuts and manufacturer logos



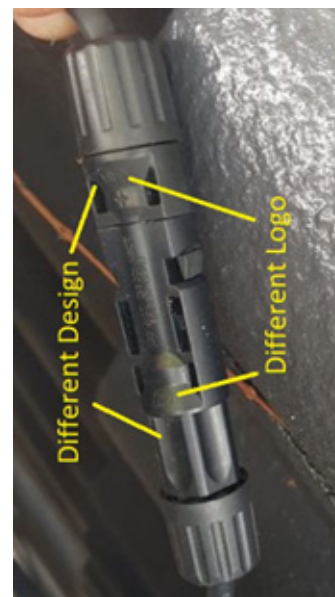
Different screw nuts, body mouldings and logos



Different manufacturer logos

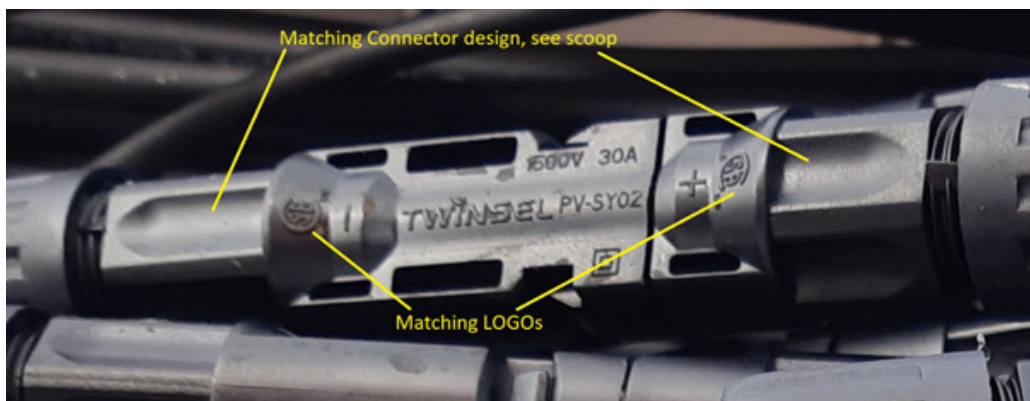


Different design and logo



Different design and logo

Complying DC connector



Matching connector design and logos

Battery Energy Storage System installation requirements

AS/NZS 5139:2019 Electrical installations - Safety of battery systems for use with power conversion equipment

Explanation of restrictions surrounding location and proximity of equipment to Battery Energy Storage Systems (BESS).

AS/NZS 5139:2019 was published on the 11 October 2020 and sets out general installation and safety requirements for BESS.

This standard places restrictions on where a BESS can be located as well as restrictions on other equipment located in close proximity. As the BESS is considered to be a source of ignition, the requirements within this standard ensure that the unit is adequately protected from external influences that may cause damage to the BESS and to ensure that external ignition sources do not pose a risk to the BESS.

Restricted locations of the BESS

Sections 4, 5 and 6 of AS/NZS 5139:2019 place specific restrictions on where a BESS may not be installed and include the following:

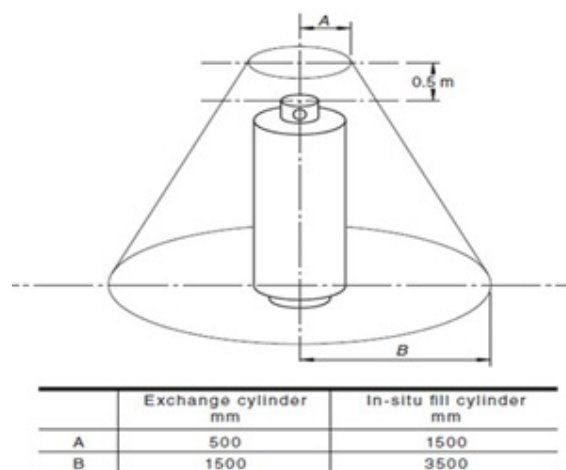
1. External damage

- a. In a location where damage from external influences may be expected e.g. from damage by a vehicle.
 - i. Additional measures may be used to mitigate the risk, e.g. a bollard/s installed to

- prevent vehicle contact, or
 - ii. Installation in a position providing the protection necessary to prevent contact.

2. Hazardous locations

- a. In a hazardous area as defined in AS/NZS 3000
 - i. Refer fig 4.18 of AS/NZS 3000:2018 for distances from gas cylinders and,
 - ii. Fig 4.19 for distances from gas relief vent valves.



3. Airflow & vents

- a. Within 600mm horizontally and 900mm below;
 - i. an opening window to a habitable room;
 - ii. vents including mechanical, electrical or other ventilation openings to habitable rooms.

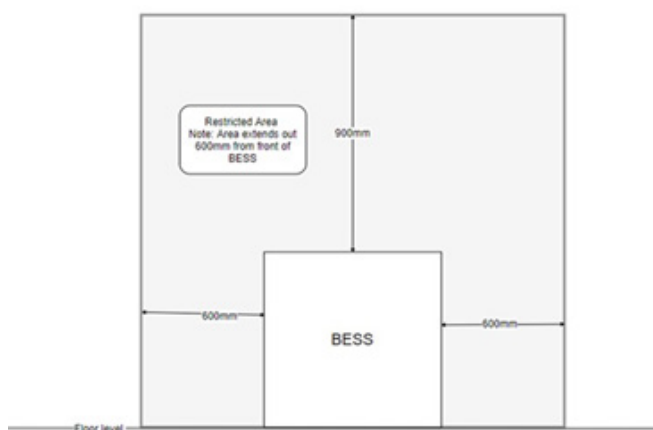
4. Passageways, walkways, exits and escape routes

- a. Within a passageway, walkway exits and escape or evacuation routes.
- b. Underneath or below entrance and exit walkways, staircases, evacuation and escape routes and passageways external and internal to the building.

Notes to both 4(a) and 4(b) (on previous page)

- i. These requirements include all structures irrelevant of the construction method or materials.
- ii. Smoke generated from a burning BESS may be noxious and therefore impede a person from utilising an escape route directly above the BESS.
- iii. In timber framed structures, structural damage will occur initially above a fire and may affect the structural integrity of the escape route above.

- c. Within 600mm from an exit that has an opening 900mm or less:
- i. Openings that are wider than 900mm, e.g. a garage opening, must allow a person to pass more than 1000mm from the nearest side of the BESS.



5. Accessibility

- a. On roofs:
 - i. Excluding roofs that are accessible via a permanently installed or fixed staircase or access ladder.
- b. Within ceiling spaces, or

- c. Set into wall cavities:
 - i. A recess that is entirely sealed to the cavity with non-combustible material is not considered a wall cavity, and
 - ii. A BESS that is installed within a separate non-combustible enclosure or housing that is recessed into and entirely sealed to the wall cavity, is not considered recessed into the wall cavity.

6. Other

- a. In any location where the installation of a switchboard is prohibited;
 - i. Refer Clause 2.10.2.5 of AS/NZS 3000:2018.
- b. In any location where the installation of a generation system is prohibited,
 - i. Refer clause 6.2.4.7, 6.3.4.7 and 6.4.4.7 of AS/NZS 3000:2018.
- c. Other locations specifically prohibited by the manufacture,
 - i. Refer to the specific manufacturer's installation instructions for your product.

Restricted area surrounding the BESS

Electrical appliances (as defined by AS/NZS 3000) not associated with the BESS may not be located closer than 600mm horizontally nor 900mm above the BESS.

These include but are not limited to:

- Heat pumps, air-conditioning equipment and associated control gear
- Hot water cylinders (gas and electric)
- Motors and control gear
- Stoves and hotplates
- Gas cooktops
- Stationary appliances (as defined by AS/NZS 3000).

Solar inverters supplying the BESS are excluded from the restriction.

The following equipment are not considered to be electrical appliances under the definition:

- Switches and isolators.
- Socket outlets.

Barriers behind the BESS

When a BESS is installed on a wall or placed on the ground within 300mm of a wall with a habitable room on the other side, there is an additional requirement to install a non-combustible barrier on the wall behind the BESS to delay the spread of fire.

A habitable room is defined in clause 1.3.42 of AS/NZS 5139:2019 and includes, but is not limited to the following:

- bedrooms, study rooms and rooms used as home offices;
- living, family or lounge rooms;
- kitchen and dining rooms;
- playrooms and sewing rooms;
- TV, music and entertainment rooms; and
- sunrooms.

A surface is deemed to be a non-combustible barrier after being tested in accordance with AS 1530.1 (Methods for fire tests on building materials, components and structures - Part 1: Combustibility test for materials).

Materials exempt from the need to be tested to this standard include:

- brick or masonry blocks;
- concrete;
- compressed cement sheeting; and,
- ceramic or clay based tiles (also known as terracotta).

Note: Although not a mandatory requirement, cement sheeting with a thickness of 6mm is considered industry best practice.

Walls that are constructed of one of these materials do not require further barriers.

Barriers installed behind the BESS need to extend to at least the following limits:

- a. 600mm beyond the vertical side of the BESS;
- b. 900mm above the BESS; and
- c. If the BESS is within 900mm of the ceiling surface, the ceiling must be protected with a barrier that extends 600mm past the outer extremity of the BESS, and level to its lowest portion.

The following are not considered suitable barriers, whether coated by a covering or not:

- Timber panels.
- Plasterboard.
- Particle board.

Barriers may not have perforations or other openings within the required dimensions and any opening greater than 5mm shall be sealed with a fire retardant sealant.

Fluorescent light fittings – shock risk

Suffering a shock from any light fitting can be very serious, leading to falls from a ladder or work platform. Such shocks are a particular risk from fluorescent fittings, which can be avoided by:

- Complying with Regulation 55 of the Electricity (Licensing) Regulations 1991 (no live work!).

- Checking that the light fitting is appropriate for the location (does it need to be IP rated, are condensation, water spray or dust ingress likely).
- Appropriate preventative maintenance (are the correct diffuser covers fitted).
- Replace the starter when replacing the fluoro tube.
- When replacing fluoro tubes with LED, make sure the fitting and lamp comply with AS/NZS 60598.2.1.
- Check that the replacement LED lamp does not leave exposed live parts if the diffuser or cover are removed.

Student work experience

Work experience students performing any electrical work must be licensed. They must be pre-apprentices, apprentices or trainees under a contract approved by the Department of Training and Workforce Development.

Allowing non-licensed students to do electrical work can have serious consequences for both the student and the employer concerned.

Licensed students should be appropriately supervised and be allocated only the forms of work suitable to their knowledge and skills.

Work experience students, who do not hold an electrician Training Licence are not to perform electrical work.

Care with switchboard wiring

Faults originating from internal switchboard wiring can be especially dangerous and damaging. Active to neutral or earth faults can cause a very intense arc flash while making the board enclosure and its earthing system live during the fault. The shock risk for persons working on or standing near the switchboard can be very serious indeed. Apart from this personal risk, the board may be damaged and need replacing.

It is important to take special care when adding or altering internal switchboard wiring on, for example, hinged panels which, when closed, can force wiring against an uncovered neutral link, damaging insulation and leading to a short circuit.

Wiring needs to be properly secured to keep it free from any metal edges or pinch points, especially if mounted on hinged panels.

There is often very little free space in modern switchboards.

Terminations on hinged panels must be secured to prevent mechanical strain when the panel is opened and shut. Wiring must be of sufficient length to allow for the panel to be opened fully and remain clear of obstructions when the panel is closed.

An electrician may be called upon to modify or augment equipment mounted on or in existing switchboards. This can present unique challenges in each particular case to ensure the above criteria are met. Careful job planning needs to be the first step before proceeding with the work.

Transportable structures

What is a transportable structure?

'Transportable structure' means a structure that can be moved readily from one site to another and on which notifiable work may be carried out.

This includes both vehicles and structures with or without wheels that can be readily moved from one site to another, either under their own motive power or by some other means.

In many instances, transportable structures used for accommodation, office spaces or lunch rooms, or sea containers (fitted out as workshops or on-site storage) at construction or exploration sites are connected by plug and cord to socket outlets powered by portable diesel generators.

Electrical contractors and electricians are reminded that such transportable structures must comply with AS/NZS 3001, Electrical Installations – Transportable structures and vehicles, including their site supplies.

All switches and protective devices must operate on all active conductors (active and neutral). Where a transportable structure, previously connected by fixed wiring, has been converted to plug and cord supply, the switches and devices must be checked and replaced with double-pole equivalents if necessary to comply with AS/NZS 3001.

Transportable structures that have their manufactured inlet plugs, plug and cords

removed to facilitate a fixed wiring connection to an electrical installation must ensure compliance with AS/NZS 3000, Wiring Rules.

Transportable structures manufactured and intended for connection by fixed wiring must comply with AS/NZS 3000, Wiring Rules.

Is your transportable structure safe?

Employers are reminded that they have a responsibility to provide and maintain, as far as practicable, a safe working environment for their workers under section 19(1) of the *Occupational Safety and Health Act 1984* and, if associated with a mine site, section 9 of the *Mines Safety and Inspection Act 1994*.

Under r.3.59. of the Occupational Safety and Health Regulations 1996 employers must ensure all electrical installations at the workplace are designed, constructed, installed, protected, maintained and tested so as to minimise the risk of electrical shock or fire.

Transportable structures connected by plug and socket arrangements must be checked and tested for safety by an electrician before the system is energised for the first time after its installation.

What is notifiable work?

'Notifiable work' means all electrical installing work other than -

- a) maintenance work, unless that work requires the disconnection and reconnection of the supply of electricity to the electrical installation concerned or the replacement of service apparatus;

- b) the addition or alteration of one final sub-circuit including the addition or alteration of its protective device; or
- c) the alteration of one or more final sub-circuits.

As a guide, the following table gives an indication of what is considered notifiable work for the connection of transportable structures in typical situations found throughout industry.

	Notifiable	Not Notifiable	ESC
Transportable structure connected to an electrical installation by fixed wiring	✓		✓
Transportable structure connected to a socket outlet on an electrical installation by plug and cord		✓	
Transportable structure connected to a generator's integral switchboard by fixed wiring	✓		✓
Transportable structure connected to a socket outlet on a generator by plug and cord		✓	
Multiple transportable structures connected together by plug and cord via a portable sub-distribution board and primary power connection is by fixed wiring to an electrical installation or a generator's integral switchboard	✓		✓
Multiple transportable structures connected together by plug and cord via a portable sub distribution board and primary power supply is by plug and cord into a socket outlet on an electrical installation or generator		✓	

Notice of Completion requirements for temporary disconnections and reconnections

Building and Energy is aware that Notices of Completion (NOC) are not always being submitted within the required three days after electrical work has been completed, especially after temporary disconnection and reconnections.

In Electrical Focus [Issue 2](#) and [Issue 3](#) we advised that Western Power has changed the steps required after electrical work is complete to help facilitate the timely reconnection of supply.

To ensure timely reconnection of power for the customer, you must complete all sections of the temporary disconnection tag and submit a NOC within three days of completing the electrical work.

Completing the temporary disconnection tag does not absolve the requirement of submitting a NOC. The NOC is a requirement under regulation 52(1) of the Electricity (Licensing) Regulations 1991.

Please visit our website to see the [frequently asked questions](#) on submitting a NOC for temporary disconnections and reconnections.

Prosecutions

Please visit Building and Energy's website to view the [Disciplinary and prosecution media releases](#).