

Technical guidance sheet 2.2

Battery system protection against the spread of fire and battery system restricted locations



Solar
Victoria



This guidance provides further information to support installers' understanding of applicable requirements in:

- » *AS/NZS 5139:2019 – Electrical installations – Safety of battery systems for use with power conversion equipment*
- » *AS/NZS 1530.1-1994 – Methods for fire tests on building materials, components and structures, Part 1: Combustibility test for materials*
- » *AS/NZS 4777.1:2016 – Grid connection of energy systems via inverters, Part 1: Installation requirements.*

To help installers maintain standards, it includes installation advice and examples of installations that may not be meeting the requirements relating to the protection of battery systems against the spread of fire and battery system restricted locations.

This guidance is part of a series Solar Victoria commissioned TechSafe Australia to develop. Energy Safe Victoria has also reviewed this guidance.

In series 2:

2.1 Physical protection of battery systems

2.2 Battery system protection against the spread of fire and battery system restricted locations (this sheet)

2.3 Battery system wiring systems

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The information provided within has been put together to highlight specific aspects of several Australian installation standards that include, but not limited to AS/NZS 3000:2018, AS/NZS 5033:2021, AS/NZS 4777.1:2016. While care has been taken to provide examples that highlight specific defects or compliance it should not be assumed that additional defects are not present in the supplied examples. It is a requirement that all aspects of the relevant Australian installation standards are followed, and compliance of any installation remains the responsibility of the installer.

This document is designed around providing best practice solutions for specific scenarios. Any advice given is general in nature and if possible, solutions to compliance issues are highlighted, it should not be assumed these are the only methods to achieving compliance.

Content provided in this guidance document has been extracted from multiple sources that are referenced on the same page. This content has been collated to help provide an overview and in no way should be referenced on its own. It is intended that all referenced material is also read in conjunction with the rest of its relative material to ensure full understanding of the context, relationship with other parts and anything not mentioned in this overview.

Battery system protection against spread of fire and restricted locations:

What is considered to be a habitable room?

AS/NZS 5139:2019 defines a habitable room as a room associated with a domestic or residential electrical installation used for normal living activities.

Some examples of habitable rooms include but are not limited to:

- » bedroom/spare bedroom
- » living/lounge/family room
- » entertainment rooms such as music studios, television/gaming/billiards rooms, theatres, bars, etc
- » kitchen/dining room
- » study
- » playroom or sunroom.

Some examples of non-habitable rooms include but are not limited to:

- » bathroom
- » laundry
- » powder room.

Additional to the above, it is important to check what the room is currently being used for and what it may potentially be used for in the future. For example, a homeowner may be using a spare bedroom as extra storage space, however it could be reverted into a bedroom at some stage in the future and therefore should be classed as a habitable room.

Standards referenced:

AS/NZS 5139:2019
Clauses 1.3.42

Definition from the National Construction Code (NCC) 2022:

Habitable room: A room used for normal domestic activities, and —

(a) includes a bedroom, living room, lounge room, music room, television room, kitchen, dining room, sewing room, study, playroom, family room, home theatre and sunroom; but

(b) excludes a bathroom, laundry, water closet, pantry, walk-in wardrobe, corridor, hallway, lobby, photographic darkroom, clothes-drying room, and other spaces of a specialised nature occupied neither frequently nor for extended periods.

Battery system protection against spread of fire: Barrier to habitable rooms

AS/NZS 5139:2019 Clauses 4.2.4.2 and 5.2.4.2 state that if a battery system is mounted on or placed against or near a surface of a wall or structure that has a habitable room on the other side, the wall or structure shall be a suitably non-combustible barrier.

If the mounting or nearby surface itself is not made of a suitably non-combustible material, a non-combustible barrier shall be placed between the battery system and the surface of the wall or structure. The dimensions for the required non-combustible barrier are listed below (Figure 1).

If the battery system is within 900mm of the ceiling surface, the ceiling must also be protected with a non-combustible barrier that extends 600mm past the outer extremities of the battery system.

Additionally, the standard states any penetration through a non-combustible barrier to a habitable room within the defined zones, with an internal free space greater than 5mm diameter, shall be sealed with a fire-retardant material. See Figure 1.3 for a non-compliant example.

Standards referenced:

AS/NZS 5139:2019
Clauses 1.3.42, 4.2.4.2 & 5.2.4.2

Figure 1.1:
Diagram explaining the dimensions of the non-combustible barrier zone for battery systems installed on a wall or surface adjoining a habitable room.

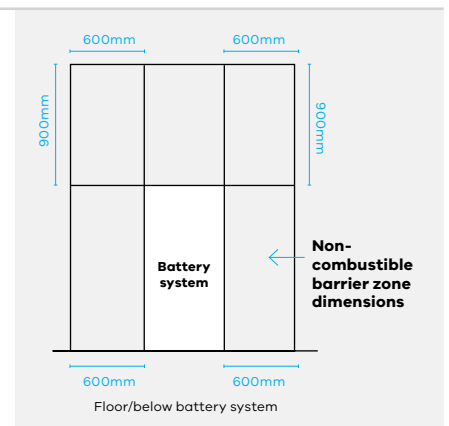


Figure 1.2
In this example a compliant non-combustible barrier made out of compressed cement sheeting has been installed to the appropriate dimensions as laid out in Figure 1.1.



Figure 1.3
The presence of a penetration greater than 5mm in diameter through the non-combustible barrier to a habitable room and within 600mm of the left edge of the battery system is non-compliant unless sealed with fire-retardant material.



Battery system protection against spread of fire:

Barrier to habitable rooms: Non-combustible material

AS/NZS 5139:2019 Clauses 4.2.4.2 and 5.2.4.2 state that in order to be classed as non-combustible a material must be tested to AS/NZS 1530.1:1994.

Exemptions to this requirement are the following materials:

- » brick or masonry block
- » concrete
- » compressed cement sheeting
- » ceramic or terracotta tiles.

Any other material not listed above must have documentation that demonstrates it has been tested and passed requirements specified in AS 1530.1 before being suitably rated to be used as a non-combustible barrier.

Note: Glass windows and corrugated steel sheeting are not automatically classed as non-combustible and must be tested to AS 1530.1:1994 before they can be used as a suitable non-combustible barrier.

Figures 2.1 and 2.2 are examples of non-rated glass being used as a barrier to habitable rooms within the specified restricted zones laid out in AS/NZS 5139:2019.

Standards referenced:

AS/NZS 5139:2019
Clauses 4.24.2 & 5.2.4.2

Figure 2.1:

Windows are not considered non-combustible under AS/NZS 5139:2019 unless they have been tested to AS/NZS 1530.1:1994

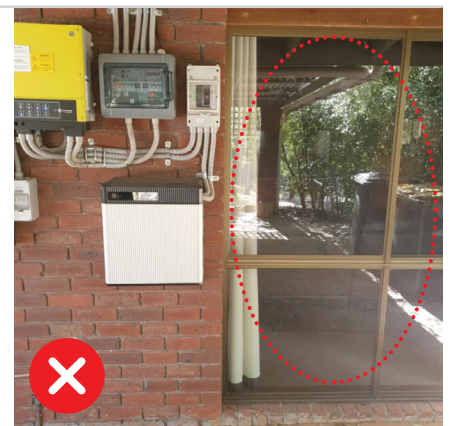


Figure 2.2:

As the battery has been installed within 600mm of a glass window that is not suitably non-combustible, this installation is non-compliant.



Battery system protection against spread of fire: Barrier to habitable rooms

In this example, a battery has been installed backing onto a habitable room. An attempt has been made to provide a non-combustible barrier of compressed cement sheeting to protect against the potential spread of fire.

It is evident the barrier does not extend the required 600mm to the left-hand side of the battery system. There is also a combustible skirting that is within the defined zone.

Additionally, a gap with internal free space greater than 5mm has been created in the non-combustible barrier to install a socket outlet that is not sufficiently rated as non-combustible.

See Figure 3.2 where the Installer has covered the combustible surfaces with a non-combustible barrier to the required dimensions prescribed in AS/NZS 5139:2019.

Standards referenced:

AS/NZS 5139:2019
Clauses 1.3.42, 4.2.4.2 & 5.2.4.2

Figure 3.1:

This photo indicates three areas of non-compliance.

- a) Presence of a socket outlet that is not non-combustible.
- b) Compressed cement sheeting which does not extend the required 600mm from edge of battery system.
- c) Wooden skirting board below the compressed cement sheeting.

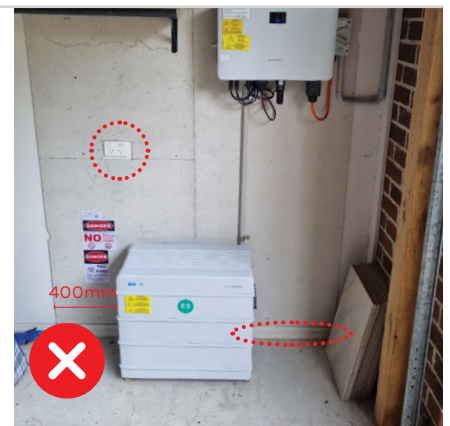


Figure 3.2:

The issues in Figure 3.1 are now remedied.

- a) The socket outlet has been removed and replaced with compressed cement sheeting.
- b) The sheeting has been extended on the left side to more than 600mm.
- c) The wooden skirting has been covered with compressed cement sheeting.



Battery system protection against spread of fire: Barrier to habitable rooms

In this example, a battery has been installed backing onto a habitable room. Whilst the wall separating the battery system from the habitable room is brick and classed as non-combustible, there are multiple gaps in the barrier that are not protected against the potential spread of fire.

Above the battery system is a switchboard enclosure with wooden backing boards. The DC isolator located below the PCE is not classed as non-combustible and has a gap greater than 5mm in diameter behind and through the brick wall.

There is also a hole larger than 5mm in diameter next to the isolator which has not been filled. Additionally, there is a combustible door/hatch separating the battery system from the combustible flooring underneath the habitable room.

Standards referenced:

AS/NZS 5139:2019
Clauses 1.3.42, 4.2.4.2 & 5.2.4.2

Figure 4.1:

- a) Wooden switchboard enclosure is considered to be a gap in the non-combustible barrier to habitable room above the battery.
- b) Refer to Figure 4.2.
- c) Refer to Figure 4.3.
- d) Combustible hatch separating battery from the combustible flooring of the habitable room.

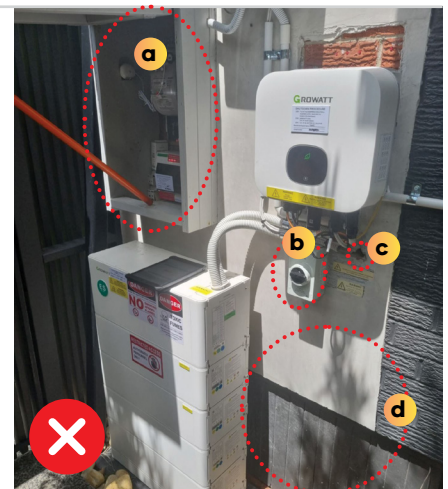


Figure 4.2:

Combustible DC isolator has a gap greater than 5mm within the barrier zone for battery and habitable rooms.



Figure 4.3:

A hole of greater than 5mm within barrier zone of battery and habitable room means this system is non-compliant.



Battery system restricted locations

AS/NZS 5139:2019 Clauses 4.2.2.2 and 5.2.2.2 state the following areas are restricted locations for a battery system to be installed in:

- » Any location specified under AS/NZS 3000:2018 Clause 2.10.2.5.
- » Within 600mm horizontally and 900mm below any exit (doorways etc).
- » Within 600mm horizontally and 900mm below the vertical side of a window or building ventilation that ventilates a habitable room.
- » Within 600mm horizontally and 900mm below any hot water unit, air conditioner or any other appliance not associated with the battery system.
- » In ceiling spaces.
- » In wall cavities.
- » On roofs, except where specifically deemed suitable (suitable roofs are deemed those with a permanent ladder or stairway for access).
- » Under stairways.
- » Under access walkways.
- » In an evacuation route or escape route (must be a minimum 1m clearance around the battery system to allow safe egress).

In addition to the above, battery systems shall not be installed in habitable rooms of domestic and residential installations.

Standards referenced:

*AS/NZS 5139:2019
Clauses 4.2.2.2 & 5.2.2.2*

*AS/NZS 5300:2018
Clauses 2.10.2.5*

Battery system restricted locations:

Appliances not associated with the battery system

In these examples, a battery system has been installed within 600mm of appliances not associated with the battery systems.

As such, the battery systems are considered to be located in a restricted location and non-compliant as per AS/NZS 5139:2019 Clauses 4.2.2.2 (d) and 5.2.2.2 (d).

Standards referenced:

AS/NZS 5139:2019
Clauses 4.2.2.1, 4.2.3.2,
5.2.2.1 & 5.2.3.2

AS/NZS 3000:2018
Clauses 4.1.2 & 4.1.3

Figure 5.1:

Exclusion zone for appliances around battery installations.

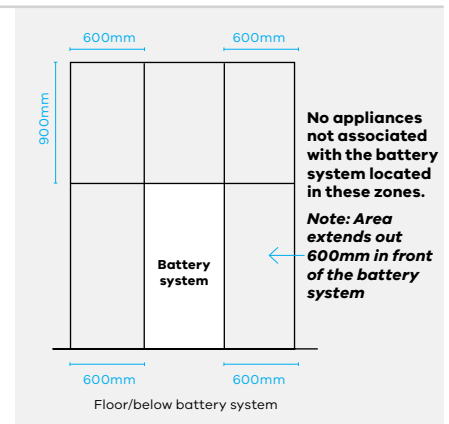


Figure 5.2:

This installation is non-compliant as the battery system has been installed within 600mm of a hot water system.



Figure 5.3:

This battery system is non-compliant as it has been installed with 600mm of an air conditioner and gas heating system.



Battery system restricted locations: Windows and ventilation for habitable rooms

In these examples, a battery system has been installed in a restricted location. Battery systems must not be installed within 600mm of the vertical side, and 900mm below a window or building ventilation system that ventilates a habitable room.

As such, the battery locations would be non-compliant with AS/NZS 5139:2019 Clauses 4.2.2.2 (c) and 5.2.2.2 (c).

Standards referenced:

AS/NZS 5139:2019
Clauses 4.2.2.2 (c) & 5.2.2.2 (c)

Figure 6.1:
Diagram demonstrating the exclusion zone for windows and ventilation systems that vent habitable rooms.

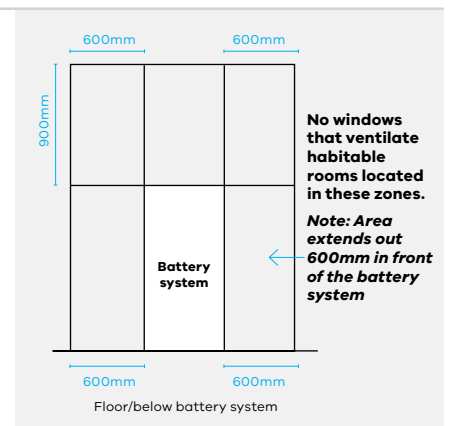
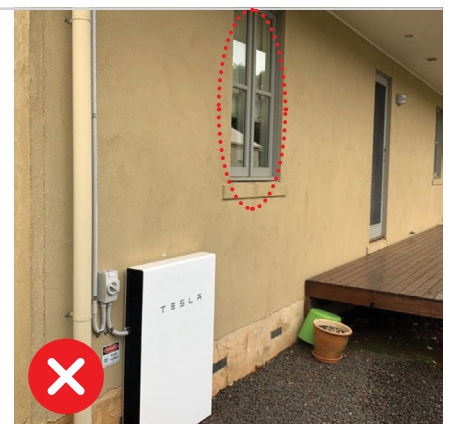


Figure 6.2:
In this example the window above the battery system vents a habitable room and is located within the exclusion zone outlined in Figure 6.1.



Figure 6.3:
The window in this example vents a habitable room and is located within the exclusion zone outlined in Figure 6.3.



Battery system restricted locations: Exit/entry doorways to rooms and building

In these examples, a battery system has been installed in a restricted location. Battery systems must not be installed within 600mm of an exit/entry doorway to a room or building.

As such the installation locations would be non-compliant as per AS/NZS 5139:2019 Clauses 4.2.2.2 (b) and 5.2.2.2 (b).

Standards referenced:

AS/NZS 5139:2019
Clauses 4.2.2.2 (b) & 5.2.2.2 (b)

Figure 7.1:
Diagram of the exclusion zone for doors and entries around battery installations.

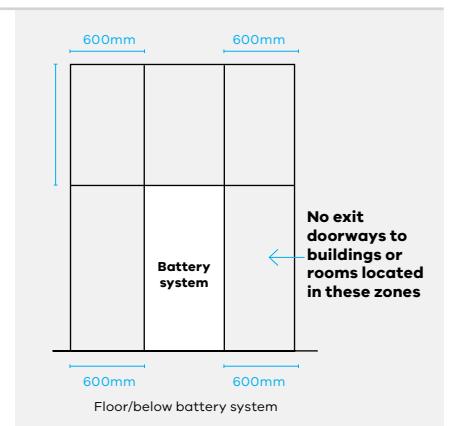


Figure 7.2:
This battery system is non-compliant as it has been installed too close to an entry or doorway.



Figure 7.3:
This battery system is non-compliant as it has been installed too close to an entry or doorway.



Battery system restricted locations:

Passageways, walkways, exits and escape routes

In this example, a battery system has been installed on a second storey balcony with one entry/exit.

In this specific scenario, as there is only one entry/exit to the balcony, the battery system cannot be placed in a location that would prohibit occupants from safely reaching the entry/exit if they were located past the battery system.

The battery systems must not be installed in an evacuation or escape route without sufficient space to egress past the system (free space greater than 1m from the front of the battery system).

Standards referenced:

AS/NZS 5139:2019
Clauses 4.2.2.2 (k) & 5.2.2.2 (k)

Figure 8:

As there is less than 1m clearance on this single exit balcony, the installation is considered non-compliant for blocking an escape route.





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