

Lithium Battery Installation Guidance Document

Background

The new Electrical Installation Standard AS/NZS 3001.2 introduces requirements for the installation of Lithium-ion batteries in Recreational Vehicles.

Recreational Vehicle installations are almost exclusively lithium-iron-phosphate batteries, installed with robust battery management systems. These battery systems are a growing preference within industry, due to their capacity to meet the increasing power needs of modern Recreational Vehicles and their good track record of safe operation in such installations.

Acknowledging some of the concerns arising recently from battery incidents, this industry practice guide has been developed with the following risk factors in mind:

- Toxic, corrosive, or explosive gasses or fumes being emitted from the battery into spaces occupied by persons, under operating and / or fault conditions;
- Fire from overheated batteries; particularly (but not limited to) thermal runaway of lithium types;
- Damage to the battery from water ingress or from being subjected to excessively high or low temperatures.
- Damage to the battery from physical impact or mechanical damage; particularly (but not limited to) impact damage during road travel or vehicle crash conditions.

Concerns about the proximity of persons utilising the Recreational Vehicle to the battery(ies) is recognised, and the consequent desire to locate batteries in external locations to minimize this risk is acknowledged. However, this proximity is recognised as an inherent situation with vehicle installations, with risks that can be mitigated but are unlikely to be completely eliminated due to the fundamental design of the vehicle. There is a significant concern that the major contributing cause of lithium battery fires (or other hazardous expulsions) are believed to be mechanical damage to the battery, such as due to impact or environmental exposure. An external location is expected to increase the risk of mechanical damage to the battery, likely outweighing any reduction of risk gained by removal of the battery further away from the living areas of a recreational vehicle.

With these considerations in mind, and taking into account recent advice from Electrical Regulators in some jurisdictions, this guidance material has been developed to assist vehicle manufacturers in meeting the intentions of the new standard AS/NZS 3001.2, and aims to resolve some of the uncertainty faced by both industry and regulators as we enter into the full implementation of the new standard.

Document Version 3: December 2023

Installation practice

1. Referencing AS/NZS 3001.2 clause 5.4.12.1

The battery compartment design and venting mechanism shall be provided to the installer by the Manufacturer and/or supplier of the lithium-ion battery.

Specifications/instructions that should be expected from the battery manufacturer/supplier are:

- Compartment size
- Construction material of the compartment.
Eg: Batteries deemed to have effects of thermal runaway may be required to be installed in a compartment constructed of a non-combustible material.
- Size and type of venting mechanism to the compartment to expel gasses to the atmosphere.

Additional information that is recommended to be considered is as follows:

- Safe operating temperature range.
- Where ventilation is required, consider using the ventilation requirements of clause 5.4.11.
- Reduce the risk to occupants of a fire involving the battery by allowing time for the fire to be noticed and the occupants evacuated...
There should be a non-combustible barrier between the battery and any occupied space, to slow the spread of fire (in either direction). For guidance on suitable non-combustible materials refer AS 1530 – Part 1.
- Consider whether a battery storage solution can be identified that would be suitable for either lead-acid or lithium battery types to allow for future interchangeability.
- Ensure that a Safety Data Sheet is available for the battery that addresses safe storage, handling and firefighting procedures.

2. Referencing AS/NZS 3001.2 clause 5.4.12.2

Lithium ion batteries shall –

- Be installed externally, ie behind a wall, compartment or barrier that prevents the egress of gases into the habitable area; and*
- Not enter the habitable area of the structure*

In order to meet these requirements, it is recommended that lithium batteries be installed as follows:

- Open to the environment, taking into account a suitable IP rating and mechanical protection.
OR

Document Version 3: December 2023

- Located in a battery compartment that is sealed to the enclosed habitable space of the recreational vehicle.

A battery compartment that opens to the exterior should

- Open outward (to the exterior of the connectable electrical installation) and
- Be accessed from the exterior of the recreational vehicle.

If access to the battery compartment is obtained from within the habitable space of the recreational vehicle the compartment must have the following:

- Fitted with openings that maintain a full seal from the enclosed habitable space of the recreational vehicle when in the closed/stored position.
- Access to the compartment must only be possible by removing screws or using a prescribed tool.
- An adequate seal from the enclosed habitable space of the recreational vehicle must be restored and maintained after removal and replacement of the compartment opening.

***Important Note:** *The preceding paragraph, relating to internally accessed battery installations, is not universally accepted by Electrical Regulators – some jurisdictions have endorsed this approach, while others do not consider it suitable. It is strongly recommended that you proceed with caution if following this method, considering both the place of manufacture as well as the final destination of your products. Consultation with the relevant State Regulator is also strongly recommended.*

Sealing of a battery compartment from the habitable space of the recreational vehicle must ensure the following:

- The construction of the compartment must prevent the ingress of any fumes or gases from entering the enclosed space of the habitable area.
- Any cable penetrations into the battery compartment must be sealed with suitable cable glands, bulkhead posts or another form of non-combustible sealing.

Further consideration should be given to the following:

- An annex is considered a habitable space of the Recreational Vehicle. Battery compartment openings should be located outside the expected enclosed space of an annex.
- The design of battery compartments should be in line with the recommendations of your battery manufacturer/supplier (as outlined above, relating to clause 5.4.12.1).

3. Referencing AS/NZS 3001.2 clause 5.4.13.1

Each lithium ion battery shall be provided with a battery management safety system either integrated into a battery pack or as a separate component. All lithium ion batteries shall comply with AS IEC 62619.

Document Version 3: December 2023

Electrical Regulator Consultation

The electrical installation standards are mandated under the Electrical Legislation of State and Territory jurisdictions and are the responsibility of the respective Electrical Safety Regulators.

It is critical to consult with an appropriately licensed electrical installer. These are identified in the standard as a “competent person”, with the precise definition of qualifications and licensing defined by Electrical Legislation in each State and Territory jurisdiction.

Ultimately guidance should be sought from the applicable Electrical Regulator in the case of any doubt or dispute relating to the application of the installation standards.