Guidance Note

# Battery Energy Storage Systems

Battery Energy Storage Systems (BESS) capture and store electrical energy produced by renewable sources like solar photovoltaic panels. This stored energy can be released when required, either for customer use or to be fed back into the supply grid.

Smaller BESS systems are compact self-contained power packs or units that are wall mounted and located inside or outside a building. Larger units are normally housed in steel containers.

## The increased fire risk

A key component within a BESS is a series of battery cells that are predominantly lithium-ion. In normal circumstances these battery cells work as intended with no issues. However, in certain situations, battery cell failure can significantly increase the risk of fire.

Battery cells can fail for various reasons resulting in thermal runaway. This is a rapid, uncontrolled release of heat energy from the battery cell when the battery generates more heat than it can effectively consume.

Thermal runaway in a single cell can trigger a chain reaction that heats up neighbouring cells. As this process continues it can result in a battery fire or explosion and can be an ignition source for larger fires spreading through the premises.

## Risk advice line

Should you have any additional questions on this topic or other risk-related matters, as a valued Ecclesiastical customer you can contact us through our Risk Advice Line on

**0345 600 7531**

(Monday to Friday 9am – 5pm, excluding bank holidays)

and one of our in-house risk professionals will be able to assist.

Alternatively, you can email us at

**risk.advice@ecclesiastical.com**

and one of our experts will call you back within 24 hours.

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## Potential fire consequences

When thermal runaway occurs, the resulting fire is very difficult to extinguish. Most batteries create toxic and flammable gases when they undergo thermal runaway. In many cases it cannot be extinguished and must be left to burn out unlike a normal fire. It is important to mitigate the risks associated with the devastating consequences of lithium-ion battery fires to ensure your assets are well-protected, and your activities are not disrupted.

## BESS planning

Careful consideration should be given to the location of BESS during the very early stages of planning to minimise damage to your assets in the event of a fire. Project budgets can then include anticipated protection costs so you can avoid hidden surprises and you can discuss these aspects with your chosen installer.

**Please note: It would not be acceptable for battery storage systems to be located in the following areas:**

- In any sleeping accommodation
- On any means of escape routes, such as hallways, corridors, or staircase enclosures
- Within any service lifts or risers
- In storage cupboards of combustible construction and/or containing any combustible items
- Within roof voids, loft spaces or other similar concealed spaces
- Within basements or cellars, unless they contain external access and in a separate fire compartment from the rest of the accommodation
- On any combustible wall linings/structures.

## Appropriate and proportionate protections

It is important that appropriate and proportionate controls are implemented to manage or mitigate the potential fire risk BESS present. These include the following measures: -

- Ensure the BESS installation is designed and undertaken by a competent contractor. The Micro Certification Scheme (MCS) maintain a membership list of reputable and competent installers. **https://mcscertified.com/**.
  It is important that the experience of the installer is established in the sector you operate e.g. heritage.
- Ideally, the best place for battery storage is an external location. Any external building must be located at least 10 metres away from adjacent buildings to avoid fire spread and it must be constructed to provide a minimum of 60 minutes fire resistance for smaller systems. This should be increased to 90 minutes or 120 minutes for larger storage facilities depending on size.
- If the BESS is being located internally, this must be enclosed in a fire resisting compartment providing a minimum of 60 minutes fire resisting construction. This should be increased to 90 or 120 minutes for larger storage facilities depending on size.
- Ensure the BESS are located in compartments/locations where temperatures will not exceed the safe operating temperature specified by the BESS manufacturer.
- To minimise the potential fire and explosion risk a suitable ventilation function must be included in the design of the system
- A mains-operated automatic fire detection must be provided throughout the BESS storage and charging areas. The system must have the capability of alerting keyholders and incorporate remote signalling to a 24-hour manned Alarm Receiving Centre certified to BS5979 Category 11 or BSEN 50518.

- For larger commercial or industrial systems “off gasing” early warning detection and fire suppression installations should be considered.
- Fire extinguishers may be specified for use in tackling lithium-ion battery fires. These may provide some benefit. You should seek guidance from your fire extinguisher appliance supplier for the most suitable extinguisher to use and staff should be suitably trained in their use. Even with early application, the extinguisher recommended may not fully extinguish a developing battery fire or prevent the batteries reigniting. Given life safety priorities, their usage should be carefully considered as an action or not identified from your revised fire risk assessment.
- Protect BESS from potential mechanical damage e.g. use a barrier to protect from vehicle impact.
- In non-domestic premises the site Fire Risk Assessment must be updated to cater for the presence of the BESS system and any appropriate recommendations be actioned.
- The Fire and Rescue Service should be advised of the proposed system and design and be invited to visit the premises following installation so they can familiarise themselves with the layout and assess how best to tackle any fire.
- You should retain original BESS documentation, including installation and operating instructions and users must be made aware of correct BESS operations and servicing requirements.
- You must produce an emergency response plan to highlight responsibilities and actions in an emergency event involving BESS.

## Key message

You must inform your insurers if you plan to install BESS at your premises. These systems can present a significant fire hazard when introduced to your premises. Additional protections are required to mitigate the risk of fire damage to properties and must be considered at the project design stage and funded as necessary. You should complete our underwriter questionnaire at the design stage and submit to us for review if you are considering installing BESS.

If the above listed protections are not suited to your location, you must share alternative protection proposals with us.

**Please note this is emerging technology and this guidance is being regularly reviewed to ensure best protection practice is being made available.**

## Further Information

- PAS 63100:2024  Electrical installations – Protection against fire of battery energy storage systems for use in dwellings – Specification.
- FPA RISCAuthority RE2 Need to Know Guide: Lithium-ion Battery Storage
- Cross UK: Fire safety concerns with lithium-ion batteries
- **The WHITE BOOK Refurbishment Guide**

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