

Lithium-Ion Batteries

Building Standards Guidance Note 8

Introduction

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The emerging risk of fires starting from charging of lithium-ion batteries is of concern particularly as no formal guidance is provided in Approved Document B. However, the guidance states that Building Control Bodies and Design Teams should establish if the guidance is appropriate, and it has been explicitly established through the Grenfell Enquiry that guidance being “silent” does not necessarily indicate compliance.

This guidance note gives advice on recognition and mitigation of the issues presented to enable surveyors to encourage design teams to consider the risk. Since this Guidance Note was first published, research into Approved Document B (ADB) have been released. This note has been updated to reflect key observations made in these documents.

The design team should be clear that they are ultimately responsible for the compliance of their design.

The scope of the note includes, batteries taking charge from renewables, recharging of mobility scooters and electric wheelchairs, and recharging of electric bikes and scooters. This note does not cover electrical vehicle charging. This is covered in our Guidance Note 5 and the Office for Zero Emission Vehicles (OZEV) T0194 – Covered car parks - fire safety guidance for electric vehicles.

Consideration needs to be made of the building’s use, size and complexity of design and construction.

Usefully, BS ISO 3941 2026 has added “Class L Fires involving lithium-ion cells and batteries, where no lithium metal is present” to the standard.

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It notes “Class L fires are electrochemical fires that, by comparison to most class A, B, C, D, and F fires, have a greater energy density that can result in a faster growth rate when released.”

Additional information related to class L provided below.

“In addition to the fire hazard, there are several additional potential safety hazards, including venting of hot and explosive gases, toxicity of the gases, presence of physical obstruction(s) that hinder the agent from reaching the seat of the fire source, cascading thermal runaway which is uncontrollable heat transfer from cell to cell, projectile expulsion of hot and/or burning cell(s) from the fire source and/or exposure to leaking electrolyte. Stranded energy, which remains in damaged cells after initial firefighting efforts, can cause reignition and pose an electric shock hazard. Damaged rechargeable lithium-ion batteries connected to a power source can pose an electric shock hazard.”

The classification formalizes the risks that the designer needs to consider in looking to meet requirements B1,B3 and B5.

Where possible in the communal parts of flats or buildings having the purpose group “other than dwellings” the space in which charging takes place should be treated as a ‘place of special fire hazard’. It should meet the guidance given in terms of fire resistance and separation as a minimum. Also, the design team should be encouraged to consider if additional mitigation would be beneficial.

Critically, the client should be clear of the ongoing residual risk they will need to manage.

There are several options that can be used in to help mitigate the risk presented by lithium-ion battery charging, they include:

- Place the battery in an appropriately located fire compartment with access for maintenance and repair.
- Environmental control, to prevent overheating of the space.
- Fire Detection.
- Fire Suppression.
- Provide battery thermal management devices that automatically cut charging if thermal runaway detected.

Recharging of mobility scooters and electric wheelchairs

Ideally charging for these modes of transport should be in a separate fire compartment that is not contained in common parts or within the residence itself. The fire resistance should be based on the level of risk the compartment presents. The risk would be determined through consideration of the size and anticipated number of charging stations within the compartment and the inclusion or not of the other mitigation features listed above.

BS 9991:2024 gives guidance that this form of risk is inappropriate in general communal areas and should be situated in a separate “compartment”. The compartment should have 30-minute fire separation and be sprinklered where the building has sprinkler provision to its residences.

The design team should consider if following this guidance meets the risk presented, and whether it would satisfy the access requirements of the individual.

Also, the NFCC gives detailed guidance in Mobility Scooter Guidance for Residential Buildings, this document is particularly useful in terms of defining the risk and giving actual consequences of real life fires.

Allowance needs to be made in the design of these compartments for accessibility including:

- The numbers of residents that could utilise the space; and
- Adequate transfer spaces adjacent to the storage positions.

If it is proposed to place the charging point within the residence, meeting the functional requirements of Parts B and M need to be considered. The design should demonstrate how the integrity of the escape route is maintained to the flat entrance door. Special consideration should be given from the sleeping accommodation whilst at the same time achieving the needs of the wheelchair user given in Part M. The ideal position for storage and transfer space, for accessibility purposes, is adjacent to the entry point to the residence which creates the risk of blocking what is often the only exit from a flat in the event of a fire.

This conflict of maintaining the means of escape and placing the wheelchair storage/transfer/charging space in the ideal location from an access point of view can be potentially overcome by putting the space in a fire-resistant compartment. However, compartmenting (physically enclosing) the minimum sized space given in Part M would lead to transfer and accessibility issues. Consequently, the design team would need to consider any additional space needed to maintain its accessibility. Also, thought would need to be given for environmental controls, to prevent the build-up of heat. Finally, the need within the space for fire detection, suppression, thermal management and power cut off devices should be considered. If space considerations are tight the design team may consider this option unviable.

In this situation the client and design team may decide to use the provision of safety information to, and conditions on occupants as the best solution. The content of the safety information is the responsibility of the design team in the first instance and then that of the Responsible Person. Also, the safety information may well inform the conditions that the resident has to agree to in terms of maintenance and insurance.

From a Building Control perspective, prior to issuing a completion certificate, confirmation should be recorded that the client has received and accepted the safety information.

The research into ADB recognises the conflict in guidance outlined above and recommends the authors of ADB and ADM coordinate future guidance to resolve the issue.

Recharging of electric bikes and scooters in residential properties

The assumption in the guidance given in both ADB and BS 9991 is that common escape routes and protected entrance halls within flats will be free from ignition risk. The growth of the use of e-bikes and scooters means this assumption is unsafe and a significant number of fatalities have occurred due to lithium-ion battery fires propagating within these spaces.

Sweco do not think this risk can be practically managed through the Building Regulations. The risk should be recognised during the design process and the client involved in deciding how they wish to control the risk. Depending on the nature of the building, the Responsible Person may be able to impose various conditions on the occupants to control the risk for example standards of maintenance and insurance.

The research into ADB comments on this risk and that consideration should be given to both the risk of charging within residences and the displacement of charging to common areas that also serve as routes of escape.

Batteries taking charge from renewables

It is increasingly common now to install lithium-ion batteries with residential PV installations. Given the structural and fire precaution issues presented by the installation of these systems, this work is material and controlled under the Building Regulations.

It is our view that where possible all the above mitigation should be provided. The compartment should ideally be entered from external air, the entry point should not prejudice a final exit or result in the risk of a breakout fire playing over window openings. Where this is not possible the compartment should be placed as remote from internal circulation/escape routes as possible. The fire resistance should be a minimum of 30 minutes. Ultimately the design team should substantiate the fire resistance chosen based on the risk.

Batteries taking charge from renewables

It is our view that placing a battery in the traditional truss, cold deck residential roof space is inappropriate as:

- The cold deck roof spaces are not environmentally controlled and the increases in temperature that occur on hot days are inappropriate for lithium-ion batteries.
- It is completely impractical to provide fire resistance from the roof space down.
- Occupants would be unaware that a fire had started and potentially the roof space could be used for storage significantly increasing the fire load. Conventional residential Automatic Fire Detection (AFD) is not designed to withstand the typical temperature differences experienced in a residential roof space.

Since this guidance note was first issued, detailed guidance on the installation of residential batteries taking charge from renewables has been published in PAS 63100:2024. The research into ADB also gives emphasis that the positioning of the batteries should not impact on means of escape and that the suitability of linings (walls/floors /ceilings) in terms of ignitability and robustness should be considered.

Recharging of electric bikes and scooters in commercial properties

The risk should be recognised during the design process and the client involved in deciding how they wish to control the risk. There are two key factors to consider:

1. What management provisions will be in place?
 - a. Safety testing of batteries brought into building?
 - b. Active management of the E bike/scooter policy that the building design is based on?
2. Where will the E bikes/scooters (batteries) be stored and allowed to recharge? Ideally this would be in a carefully positioned, dedicated fire compartment with appropriate passive and active fire precautions.

3. If possible, the storage area should have alternate means of escape. If the storage area only has a single route of exit, the charging positions should be remote and consideration given to appropriate maximum travel distances.

Insurance Risk

It should be noted that the insurance risk may lead to a more onerous solution than in this guidance.

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