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SWECO

Fire Safety Electrical Charging Points for Vehicles

Building Standards Guidance Note 5

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Purpose & introduction

Purpose

This Guidance Note gives guidance on considerations to be made when assessing compliance with Requirements B1 – B5 for installation of electrical vehicle charging points within buildings.

It gives guidance on considerations under Part A.

Introduction

Since first publishing this Guidance Note, BS 9991 2024 has been published. It was hoped this may give greater clarity but the guidance it gives is limited to, “Designers are advised to exercise caution when incorporating facilities for electric vehicles.”

The Office for Zero Emissions Vehicles (OZEV) have published guidance, authored by Arup’s, but the guidance clearly states that following it is not a guarantee that the functional requirements of Part B have been met. Arup’s faced the same problem as all of us; a lack of definitive data on the risk and consequences of EV charging fires to base the guidance on.

The research and analysis - Real fires: Open-sided car park fire resistance (introduction and conclusion) - Published 22 December 2025 comments that further research should be carried out as the effectiveness of OH3 and HHP3 sprinkler systems are not fully understood. The same research also questioned whether it would be more appropriate to use the Hydrocarbon fire growth curve for analysis rather that the Standard time temperature fire growth curve when designing for EV battery fires.

Purpose & introduction

The current Approved Document B does not consider the risk of internal EV charging points and it is currently being reviewed in terms of the general guidance it gives for carparks. The current guidance based on a maximum 3 car fire has been rendered inappropriate by, amongst others, the Liverpool Echo Arena car park fire in 2018 and the Luton airport fire in 2023. Both these fires resulted in uncontrolled spread of fire across 1500 cars.

The Department of Levelling Up Housing and Communities (DeLUHC), through Part S, acknowledged the risk that electrical charging points present by suggesting the Part S provision for charging points need not be made in covered car parks.

This Guidance Note is meant to assist surveyors in articulating issues to design teams and clients. The OZEV guidance is a 96 page document and design teams should be referred to this publication, the list of mitigation characterised in terms of Eliminate, Reduce, Isolate, Control is particularly useful.

Both this document and the OZEV are clear that the Design Team should use a competent Fire Engineer to assess the risks presented and propose adequate mitigation.

Guidance

Overarching Compliance Principle

The responsibility for ensuring requirements B1, B3 and B5 are met due to the installation of internal charging points lie with the design team, and it would be expected that a proposal is made and justified by the design fire engineer. Also, because there is not a definitive mitigation package, management responsibilities in terms of inspection, maintenance and training are critical. The whole approach (passive/active/management) should be agreed with management and documented. From the outset it should be clear if the design is based on life safety or if the client's insurers would be looking for elements of property protection.

The commentary below gives extracts from the references used to inform this Guidance Note, they are illustrative to show the breadth of consideration the designer needs to make.

Compartmentation

Physically restricting the extent to which a fire could grow through compartmentation is beneficial although it is recognised that accommodating this in Car Park designs is difficult. The OZEV guidance suggests at the very least increasing the space between cars should be considered. The RSA and City of London guides suggests that shielding each bay on three sides with fire resistant walls would be beneficial where conventional compartmentation is not feasible.

Structural Fire Resistance

It may be that a higher fire resistance than the standard laid out in current guidance would be appropriate, also the "robustness" of the construction may be considered in terms of its sensitivity to "damage" and prolonged lithium battery fires.

Guidance (continued)

Sprinklers

The RSA guide also gives some indication of the hazard level the suppression system should be designed to:

1. FM: Hazard Category 2: 8-mm/min over 230-m2 (300-m2 dry systems).
2. NFPA: Extra Hazard Group 1 (EH1): 8.2-mm/min over 465-m2 (605-m2 dry systems) to 12.2-mm/min over 230-m2 (300-m2 dry systems). Note this is more onerous than the LPC and FM designs chosen but the next occupancy protection level down (OH2) is considered potentially insufficient.
3. LPC: High Hazard Process 1 (HHP1): 7.5-mm/min over 260-m2 (350-m2 dry systems)

Given the fire is unlikely to be extinguished consideration should be made of the design duration.

The research and analysis - Real fires: Open-sided car park fire resistance (introduction and conclusion) - Published 22 December 2025, recommends formal research should be carried out into the effectiveness of OH3 and HHP3 sprinkler systems. Given the lack of certainty, unless validated by appropriate testing, suppression cannot be relied on to mitigate the risk.

Guidance (continued)

Misting Systems

The White Paper released by Siemens suggests that high pressure misting systems with open nozzles may be a more effective form of suppression for lithium-ion battery fires, than sprinklers, because of their ability to cool the surrounding environment.

Since the White Paper was published, Sweco have read several studies online supporting its assertions. However, each misting system should be considered unique and any proposal to use a misting system needs to be supported by specific and appropriate testing.

BS 9991 2024 has removed reference to Automatic Water Fire Suppression Systems AWFSS and only gives guidance on the use/need for sprinkler systems. Sweco's view is that this does not preclude the use of a misting system in residential buildings, but if one is proposed it would be a deviation from the guidance. The deviation would need to be validated through appropriate testing, supporting the systems performance in relation to its specified purpose. Also, key to the use of misting systems is the clients understanding of the dependency on the systems provider for maintenance and repair, and confidence that the arrangement provides resilience for the life of the building.

Guidance (continued)

Smoke Ventilation

Computational Fluid Dynamics (CFD) are usually provided for basement ventilation systems and this can be adapted for the smoke production and fire intensity of a lithium battery fire when developing the model. The City of London Guide makes these suggestions for CFD modelling parameters:

1. 200 Celsius at 2000mm height.

2. Heat output of 16 Mega Watts at 10 minutes (It is understood this output accounts for the City having carparks that larger commercial vehicles have access to for charging).

3. A minimum of 10 air changes per hour to support firefighting (however, elsewhere in the document it makes this statement “it is anticipated that this is unlikely to be less than 14 air changes per hour”).

It may be the case that means of smoke ventilation: natural ventilation conforming to the minimum recommendations of current design guidance may not be sufficient to assist firefighters responding to a vehicle(s) fire involving lithium-ion batteries.

Also, the interaction between mechanical ventilation and suppression systems should be considered.

Guidance (continued)

Fire Alarm System

It is unlikely that a manual fire alarm system would be acceptable, and some form of automatic fire alarm system would be needed. Its level of functionality should be commensurate to the other active and passive systems provided.

Cause and effect within and between the active systems and other elements of the mechanical services, including electrical supplies to the charging points will also be a consideration.

Other considerations

1. Independent EV charging point isolation equipment and controls, accessible for use by firefighters.
2. Provision of suitable premises information and signage for firefighters to indicate positions of EV charging points, power supply isolation controls, water supplies etc.
3. Water resistance of charging points, including where located in indoor car parks, taking into account firefighting media use (i.e. potentially large quantities of water at high pressures for a prolonged period).

Guidance (continued)

Other Considerations

4. Provision of water supplies for firefighting sufficient to meet or exceed the minimum requirements of regulatory or design guidance, taking into account the fact that fires involving vehicles with lithium-ion batteries are likely to require large quantities of water over a protracted period when compared to vehicle fires involving conventional and some other alternative fuel vehicles.
5. Positioning of spaces (balance between not prejudicing exits and allowing reasonable fire fighting accessibility).
6. Suitable protection to surfaces and drainage to facilitate post-incident clean-up and environmental protection.
7. Limit charging points to Mode 3 and 4 designs (these have some hazard management systems in them).
8. Manual/Automatic circuit cut off.
9. Crash protection for charging points.
10. Thermal imaging cameras.
11. Designing carparks for removal of fire effected EVs.
12. Security systems to limit likelihood of malicious fire starts.

Guidance (continued)

Consideration for management provisions

1. Understand the strategy. What passive and active measures have been provided as a direct result of the EV charging provision.
2. What impact does the residual risk present.
3. What is the training need for staff.
4. What daily checks should be made on equipment.
5. What routine maintenance should be carried out.
6. Stated process if issues arise from checks and maintenance.
7. Inclusion of EV fire mitigation in premises information.

Part A

Electric Vehicles can significantly increase the loading a structure can be subjected to. There has been one scheme, involving an existing carpark originally catering for a fleet of diesel HGVs being replaced by all electric HGV's. Significant strengthening was required to adequately cater for the additional load of the battery powered vehicles. A Structural analysis should always form part of the submission on schemes where EV charging is being introduced.

Key References

OZEV Guidance
White paper
RES EV Charging
Research and analysis - Real fires: Open-sided car park fire resistance (introduction and conclusion)

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