

S₂ Partnership Ltd
Intelligent Risk Management

HEALTH & SAFETY BRIEFING NOTE

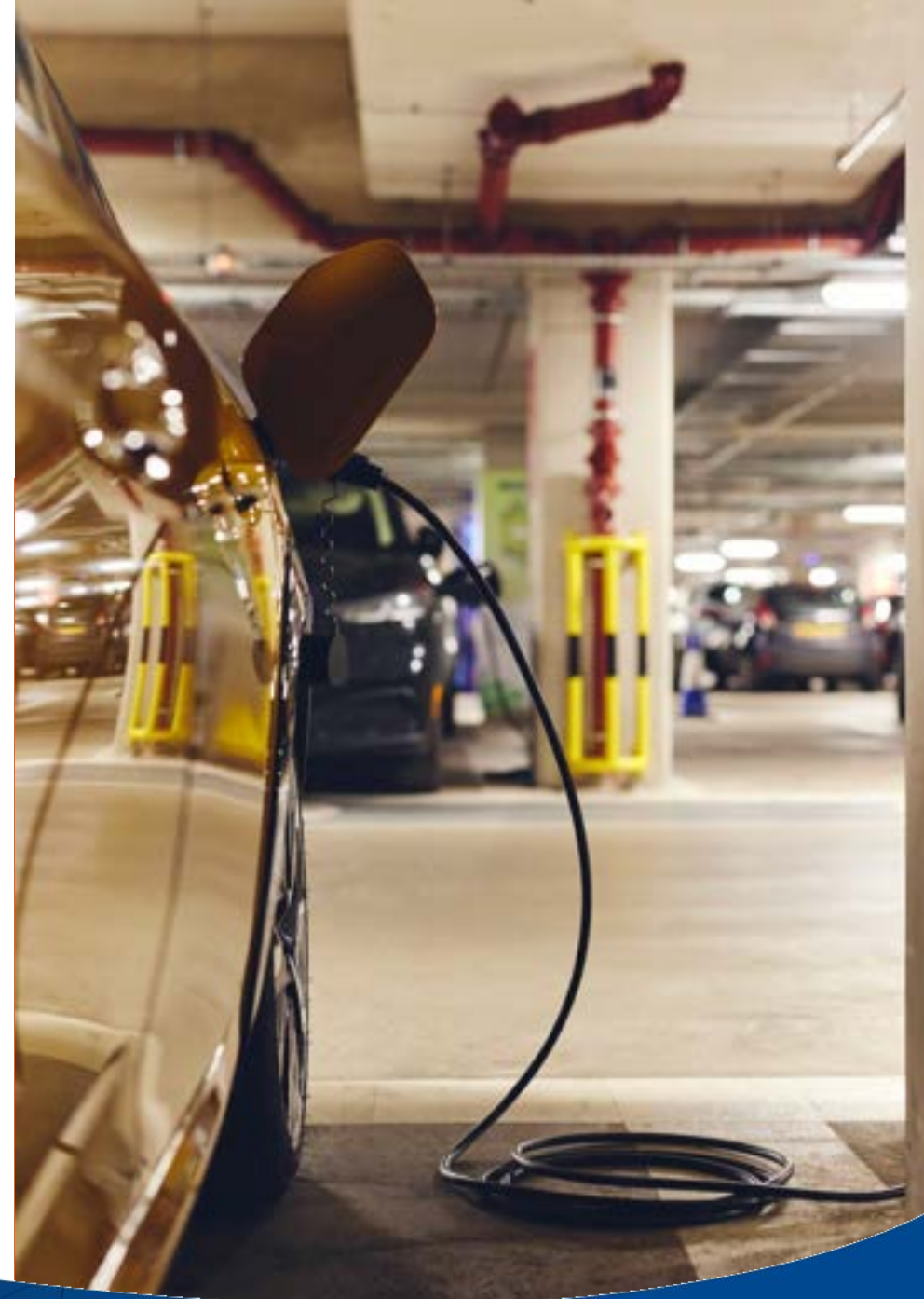
EV CHARGING POINTS IN COVERED CAR PARKS

Electrical Vehicle Charging Points

The rapid growth of Electric Vehicle (EV) sales in the UK has created a growing demand for dependable and efficient 'destination' EV charging stations in various locations like shopping centres, workplaces, and hotels. These charging stations play a crucial role in supporting the growing EV market and providing convenience to EV owners. With the rise in environmentally conscious consumers, the demand for EV charging infrastructure is expected to soar.

While there are various types of Electric Vehicles (EVs) the most commonly used battery is the lithium-ion type. Due to the limited history of EVs, there is a lack of statistical data on when fires may occur. It remains unclear whether these incidents happen while the vehicles are on the move, parked, or during the charging process. However, it is widely acknowledged that the risk of a fire involving the lithium-ion battery increases during charging. Although the occurrence of fires involving EVs is relatively low compared to traditional petrol and diesel vehicles, tackling such fires, especially those involving the batteries, poses a significant challenge.

As the usage of EVs continues to rise, it becomes crucial for businesses and establishments to understand the risks and safety measures associated with installing EV chargers, especially in car parks.



Electric Vehicle Charging Points (EVCPs)

What are the risks?

While there are various types of Electric Vehicles (EV), the most common type of battery used to store energy and power the vehicles is the lithium-ion battery.

Lithium-ion batteries have become a dominant technology for EV's due their many advantages, however they also have many fire risks associated with them. It is essential to be aware of these risks and take appropriate precautions to mitigate them. The Lithium-ion battery can be damaged by one of the following:

- Mechanical damage
- External heat source
- Overcharging

Each one of these causes may result in a chemical reaction known as Thermal Runaway. This causes the stored energy in the battery to be released as heat, resulting in a self-propagating process that produces rocket-like flames and a white flammable, toxic vapor cloud that is difficult to extinguish. The vapor cloud is typically white or slightly dark in colour, heavier than air, and tends to be found at lower levels once released.

An EV battery fire is described as 'a rocket like inferno, generating over 100 organic chemicals including some incredible toxic gases such as Carbon Monoxide and Hydrogen Cyanide, both of which are fatal to humans'. The London Fire Brigade sheds light on the risk and complexity associated with an EV Lithium-ion battery fire on their official website.

Considering the potential dangers associated with Lithium-ion batteries and the heightened risk during the charging process, it is crucial to carefully select the locations for EV Charging Points (EVCP) to help prevent such incidents from occurring.

Open-air car parks, many of the challenges posed by a vehicle fire are overcome because the heat, smoke, and harmful fumes are quickly dissipated. Nevertheless, it is prudent to address the issue of containing the water used for firefighting, as well as implementing drain traps to prevent the entry of toxic substances into surface water drains. It is highly advisable to have a knowledgeable individual conduct an Environmental Risk Assessment to identify and evaluate potential environmental hazards.

Covered car parks can be a potentially dangerous place, especially when they're enclosed or partially enclosed. It's important to be aware of the potential risks that come with these spaces. One of the main concerns is the build-up of heat, smoke, and toxic gases, which can become trapped within the building. As these elements rise, they can spread towards any openings, potentially igniting other vehicles. This process is known as Pyrolysis and occurs when the intense heat causes the materials on the surfaces of the vehicles to decompose and release flammable gases. This build-up of gases can eventually lead to a sudden and explosive flashover. Additionally, the flammable vapor produced can spread along the floor, posing a hazard in other areas of the car park. It's also worth noting that the heat from the fire can easily ignite nearby parked vehicles, further escalating the danger.

Electric Vehicle Charging Points (EVCPs)

Electric
Vehicle
Charging
Point



FIRE RISK ASSESSMENTS

A Fire Risk Assessment (FRA) should be conducted by a qualified individual who possessed the necessary expertise. The assessment should carefully consider the potential consequences of a fire incident involving an Electric Vehicle (EV) within an existing building. The FRA should identify suitable locations for Electric Vehicle charging points and charging bays in a car park, taking into account the following:

- The structure of the building and its potential fire performance are important factors to consider. Existing covered car parks may have been designed with information on how fires involving petrol and diesel cars behave, but they may not be suitable for handling a prolonged EV fire involving Lithium-ion batteries. If the car park is more enclosed, such as a basement car park, there is a higher probability of significant structural damage due to the high temperatures and prolonged fire-fighting operations. Increasing the fire protection to the structure by applying Intumescent linings, paints or other fire resisting products may be a consideration.
- A consultation with the insurance company before EVCP installation works are commissioned.
- Existing open-sided car parks offer natural ventilation but the severity of fires involving Electric Vehicles (EVs) and their batteries may have an impact on external walls above the car park and nearby buildings.
- The car park area may have introduced combustible features like electric cabling, lighting fixtures, and combustible waste storage.
- The required space for wider charging bays and the likelihood of the spread of fire to other vehicles by radiated heat and convection currents.
- Ensure the charging bays are conspicuously marked with at least a 6m space between the other charging and parking bays (if possible) and no combustible materials are stored within the marked charging bay areas.
- Is the proposed area well-ventilated by being near an opening in an open-sided car park, providing natural ventilation or near fire-rated smoke and heat extraction fans in enclosed car parks, preventing the buildup of smoke and toxic gases.
- EV Charging Points and associated bays should be positioned away from exits and not in a car park or area with only one exit route. However, if the charging bay is located at the far end of the single exit route, it should be easily accessed by the fire service and have close vehicle access and sufficient water supplies from external hydrants or a Dry Rising Main.

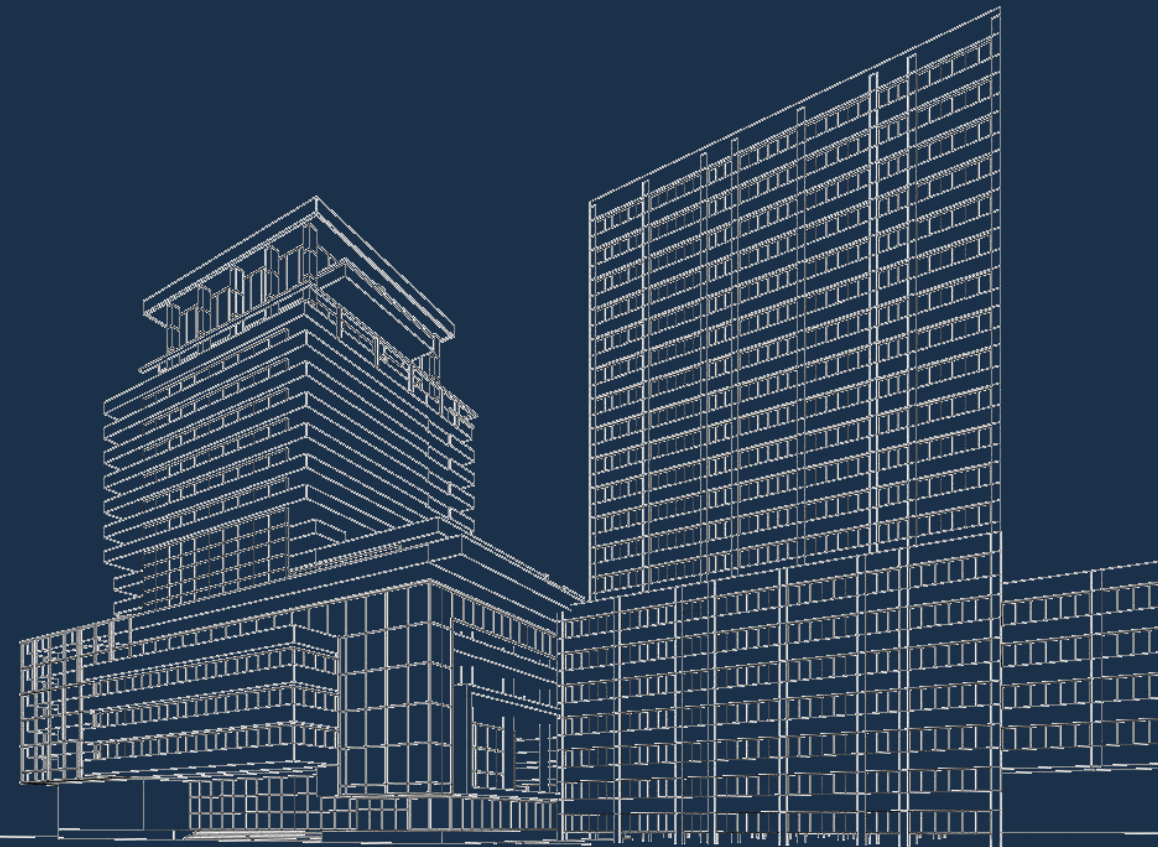
Note: The above list is not exhaustive and there may be other criteria when a site-specific Fire Risk Assessment is undertaken.

FIRE MITIGATION MEASURES

After identifying the appropriate location for the installation of charging points and associated bays, it is crucial to consider fire mitigation measures to prevent potential fires from spreading from one vehicle to another. These fire mitigation measures may include:

- Providing water-based suppression systems (Water Mist or mains fed Drencher) for car parks without sprinklers. These systems are installed over the charging bays to prevent fire spread and minimise damage to the building structure.
- Installing fire-resistant barriers near charging bays to prevent fire spread to nearby vehicles.
- Installing automatic fire detection systems (such as heat detectors, rate of rise heat detectors, combustion gas detectors or multi-point detectors) in the charging bays. These multi-point detectors can detect both combustion gasses and a relative rise in heat. Reducing the risk of false alarms but providing a quick warning of fire. Smoke detectors should be avoided to prevent false fire alarms. The system can also be connected to the charging points control systems to cut off power in case of a fire.
- Installing a Dry Rising Main with outlets conveniently located near the charging bays, such as next to a vehicle access point or protected stairwell.
- Offering appropriate fire extinguishers like the 6L Lith/EX Fire Extinguisher or the 9L water-based Lithium-Ion Fire Extinguisher with cooling effect, along with dedicated EV Fire Blankets, allowing trained staff to intervene early.

Note: The above list is not exhaustive and there may be other criteria when a site-specific Fire Risk Assessment is undertaken.



GENERAL CONSIDERATIONS

The provision, maintenance, and protection of Electric Vehicle Charging Points (EVCP) is extremely important. An unsuitable or faulty charging point can lead to severe consequences, such as electrical abuse to the EV lithium-ion battery, resulting in overheating and consequently cause thermal runaway.

Outlined below are some key factors to consider, although there may be additional considerations once a site-specific FRA is carried out.

- Supply certified and approved EV Charging Points in accordance with BS EN 61851. Mode 3 & Mode 4 EVCP include built-in fault monitoring interface.
- An authorised member of the Competent Person Scheme must appropriately design, plan and install the Electric Vehicle Charging Point, equipped with a manual isolation point.
- Impact protection should be provided to protect the EVCP from being impacted by vehicles
- If Automatic Fire Detection is provided within the car park or locally within the charging bays. The Automatic Fire Detection System should be interfaced to the Electric Vehicle Charging Point supply isolator.
- Arrange for a competent person to periodically service the Electric Vehicle Charging Points.
- If an Electric Vehicle Charging Point becomes faulty it must be immediately isolated.
- Check EV Charging Points for loose cables and ensure they can be easily returned to the cable and socket store point to prevent hazards.



How can we help?



S₂ Partnership is a leading safety risk management specialist for the commercial property sector. Our knowledgeable, independent consultancy services and RiskWise property risk management software are trusted by many of the leading managing agents, property owners, investors and insurers within the industry.

The S₂ Partnership has a dedicated team of Fire experts who can provide risk assessments, training, guidance and fire safety management systems to a range of organisation's to meet legal obligations. S₂ keeps abreast of the latest changes in regulations and works with clients to develop robust safety solutions, providing just the right support to each individual business to protect lives, buildings and businesses.

We hope you find the information contained in this document helpful.

Please do not hesitate to contact us if you require any further guidance or support.

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Call: +44 (0)1954 267788

www.s2partnership.co.uk

Please note that the following guidance serves as an initial guide for considering the installation of Electric Vehicle Charging Points (EVCPs) and assessing their viability. Once the constraints of external areas and existing parking facilities have been considered and a suitable charging point has been identified, refer to the official government document T0194 - Covered Car Parks Fire Safety Guidance for Electric Vehicles, available as a free PDF on Gov.uk. This document provides guidance on installing EVCPs in open-air and covered car parks. It should be used as a reference for an initial survey.

Reference Documents

The below reference documents are recommended, to be consulted, once a decision has been made that the site or building may be suitable for the installation of Electric Vehicle Charging Points.

T0194 – Covered Car Parks Fire Safety Guidance For Electric Vehicles

Issued on 11th July 2023 and available from Gov.uk: T0194 – Covered Car Parks Fire Safety Guidance For Electric Vehicles (EV). This interim guidance document outlines fire safety considerations and measures that operators, designers, and owners of covered car parks (both new and existing) can take with regards to Electric Vehicles (EVs) or Electric Vehicle charging points (EVCPs) when:

- Retrofitting existing covered car parks for the provision of EVs/EVCPs.
- Designing new covered car parks for the provision of EVs/EVCPs.

Fire Protection Association (FPA)

RC59: Recommendations for fire safety when charging Electric Vehicles - Available from the Fire Protection Association.

London Fire Brigade official website provides information on EV Fires and the risks posed by Lithium-ion batteries in Electric Vehicles, E- bikes, E-scooters and Lithium-ion batteries in general use.