The Changing Landscape of Fire Safety in Covered Car Parks with the Arrival of Electric Vehicles

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Abstract : In 2020, the UK government announced that sales of new petrol and diesel cars would end in 2030, and battery-powered cars made up 1 in 8 new cars sold in 2021 – more than the total from the previous five years. The guidance across the UK for the fire safety design of covered car parks is changing in response to the projected rapid growth in electric vehicle (EV) use. This paper discusses the current knowledge on the fire safety concerns posed by EVs, in particular those powered by lithium-ion batteries, when considering the likelihood of vehicle ignition, fire severity and spread of fire to other vehicles. The paper builds on previous work that has investigated the frequency of fires starting in cars powered by internal combustion engines (ICE), the hazard posed by such fires in covered car parks and the potential for neighboring vehicles to become involved in an incident. Historical data has been used to determine the ignition frequency of ICE car fires, whereas such data is scarce when it comes to EV fires. Should a fire occur, then the fire development has conventionally been assessed to match a 'medium' growth rate and to have a 95th percentile peak heat release of 9 MW. The paper examines recent literature in which researchers have measured the burning characteristics of EVs to assess whether these values need to be changed. These findings are used to assess the risk posed by EVs when compared to ICE vehicles. The paper examines what new design guidance is being issued by various organizations across the UK, such as fire and rescue services, insurers, local government bodies and regulators and discusses the impact these are having on the arrangement of parking bays, particularly in residential and mixed-use buildings. For example, the paper illustrates how updated guidance published by the Fire Protection Association (FPA) on the installation of sprinkler systems has increased the hazard classification of parking buildings that can have a considerable impact on the feasibility of a building to meet all its design intents when specifying water supply tanks. Another guidance on the provision of smoke ventilation systems and structural fire resistance is also presented. The paper points to where further research is needed on the fire safety risks posed by EVs in covered car parks. This will ensure that any guidance is commensurate with the need to provide an adequate level of life and property safety in the built environment.

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