



Electric Vehicles & Mobility Devices

Sarnia Rusbridge – Society of Fire Safety

Special Hazard?????

A hazard is any source of potential damage, harm, or adverse health effects on people, property, or the environment.

"Special" refers to something not ordinary or usual, often distinguished by unique qualities, higher importance, or a specific purpose.



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DTS Provisions

E1D17

Suitable additional provision must be made if special problems of fighting fire could arise because of—

- (a) the nature or quantity of materials stored, displayed or used in a building or on the allotment; or
- (b) the location of the building in relation to a water supply for fire-fighting purposes.

E2D21

Additional smoke hazard management measures may be necessary due to the—

- (a) special characteristics of the building; or
 - (b) special function or use of the building; or
 - (c) special type or quantity of materials stored, displayed or used in a building; or
 - (d) special mix of classifications within a building or fire compartment,
- which are not addressed in E2D4 to E2D20.



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Research from EV Fire Safe indicates that of the more than 180,000 EVs in Australia, there have only been eight EV battery fires since 2021 and 511 globally since 2010. Of these fires, only three occurred in underground or enclosed spaces (all were private garages) in Australia, with 117 occurring globally.

Only one incident in Australia occurred with an EV attached to a charger, and the EV was located outside on the street. 80 EV fires occurred globally when attached to a charger, but no information is provided in relation to the location of the charger.



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The presence of Li-ion batteries within EVs makes them susceptible to a phenomenon known as 'Thermal Runaway'.

A battery fire that results from a thermal runaway reaction will often exhibit horizontal jet flames and abrupt bursts of flame associated with failure of the material that encases the individual battery cells.

A horizontal jet flame can lead to rapid ignition of combustible items or other vehicles that are located within its area of influence. Multiple jet flames can be produced at various stages of the fire's development, each initiating as individual cells of the battery rupture.



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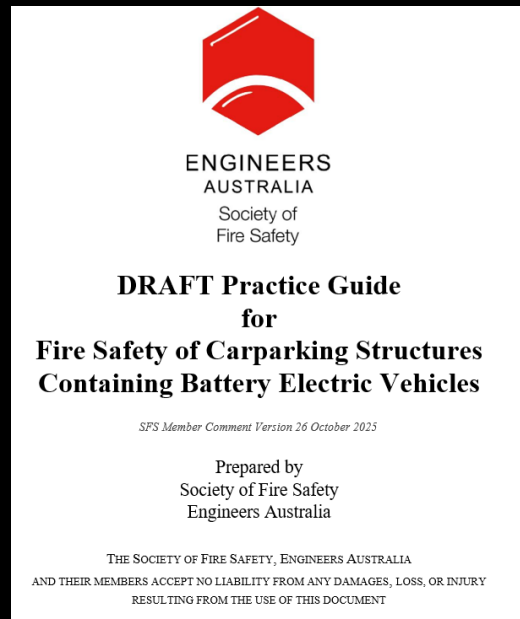
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SFS is preparing a guide for best practice to address fire safety of carparking structures containing battery EVs.



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Passive Protection

At least maintaining 120/120/120 FRLs, reduction to 60/60/60 may not be adequate:

- Longer running EV fire
- Heavier vehicles
- Longer fire brigade presence



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Active Protection

Sprinklers may not suppress or extinguish a fire, but are likely to limit fire spread

- Type of system – new vs existing buildings
- Type of sprinkler head & spacing

Additional detection requirements

Smoke hazard management



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Occupant Egress

- Early stages of fire no different to ICE, but is fire size comparable?
- Get people out
- Try to avoid chargers at exits
- Clear exit signage
- Exit paths



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Fire Brigade Intervention

- Hydrant location and numbers
- Simultaneous flow with sprinklers
- Signage at FDCIE to identify EVs



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Small battery powered devices

In recent years in Australia, incidents involving fires and thermal runaway in lithium-ion batteries have underscored the importance of addressing these risks proactively. Fires involving micro-mobility devices have become a frequent occurrence and carry both life safety and property protection concerns.



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Are these also special hazards?

- Dedicated charging zones in apartment buildings – i.e., bike room
- Prohibition of charging in public corridors



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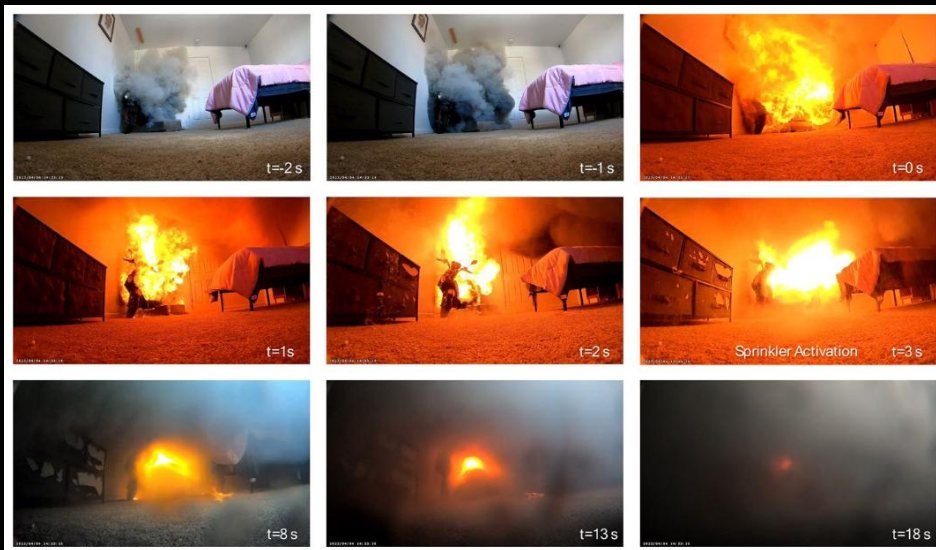
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Sprinklers



Fire Technology (2025) 61:5753–5772
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Examining the Impact of Residential Fire Sprinklers on e-Scooter Fires Initiated by Thermal Runaway of Li-Ion Batteries

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Abstract

Lithium-ion battery (LiB) powered devices are in use every day and function as designed, however there have been reports of fatal fires involving LiB powered micro-mobility vehicles from around the globe. When a LiB fails and starts a fire, it is typically the result of the battery suffering thermal runaway. Failure of LiBs in micro-mobility vehicles has been shown to create a rapidly growing ignition source that is capable of igniting nearby combustible materials within the room of origin and forcing the room to flashover in less than a minute. The impact of such rapid-fire growth has been reported in the media around the world. This type of rapid-fire growth is almost unprecedented in residential buildings and calls into question: can residential sprinklers control such a rapidly developing fire? This study investigates the impact of such rapid-fire growth in a residential building with both full-scale bedroom and living room fires started from the thermal runaway of a LiB in a sit-on e-scooter. Results from this study quantify the impact of residential sprinklers and clearly show the effectiveness of residential fire sprinklers on fires resulting from thermal runaway of sit-on e-scooters.

Keywords Lithium-ion battery · e-Scooter · Fire sprinkler · Micro-mobility · Thermal runaway



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