

## RISK MANAGEMENT

**Electric Vehicles  
in Parking Garages****What is the hazard and risk?**

Electric vehicles (EVs) are equipped with lithium-ion batteries. Every lithium-ion battery contains a highly volatile and flammable liquid electrolyte. This electrolyte increases the fire and explosion risk, especially in high temperatures.

During normal operation, the lithium-ion battery produces heat as a by-product. Typically, this heat is safely dissipated, but sometimes, the heat cannot be cooled normally, which creates “thermal runaway,” a dangerous battery failure. When thermal runaway occurs, it can result in fire, explosion, smoke, and the release of toxic gases such as carbon monoxide, carbon dioxide, sulfur dioxide, and more.

Common causes of thermal runaway:

- Overcharging a battery
- Rapid charging that can lead to excessive current
- Internal or external short circuit
- High and low temperature environments
- Physical damage to the battery (crushing or puncture)
- Manufacturing defects

Complicating this situation further is the difficulty with extinguishing lithium-ion battery fires. Water helps cool the battery but is unable to put out the fire until the battery’s energy dissipates. Firefighters need specialized fire suppression and containment equipment to extinguish lithium-ion battery fires, and this process can still take hours. The lengthy burn time increases the thermal and non-thermal damage to homes, buildings, property, and valuables.

**What can you do to mitigate the risk?**

Electric vehicle and lithium-ion battery technologies are still evolving. Similarly, the guidance on how best to protect against the risks of these vehicles is improving. To confirm you have the most current guidance for your jurisdiction, contact your local building or fire code official.



### Follow these guidelines to reduce risks at your facility:

- Place EV charging stations outdoors, away from buildings whenever possible.
- Install all charging stations and electrical equipment according to NFPA 70 (National Electric Code) and local Authority Having Jurisdiction (AHJ) requirements.
- Build parking garages with non-combustible materials and include an active automatic sprinkler system.
- Use listed and labeled equipment for all EV charging stations, following UL 2202, Standard for Electric Vehicle (EV) Charging System Equipment.
- Make sure all charging equipment complies with UL 2594, Standard for Electric Vehicle Supply Equipment.
- Verify that all wireless power transfer equipment meets UL 2750 standards.
- Equip electrical receptacles with ground fault circuit interrupters.
- Include a monitoring system in charging stations to maintain proper grounding.
- Install mechanical ventilation in line with Article 625 of the National Electric Code (NFPA 70) and interlock it to prevent charging without ventilation.
- Limit charging cables to a total length of 25 feet, including both the power supply and output cables. Use a listed cable management system for longer cables.
- Store charging cables at least 6 inches off the ground.
- Position charging cables to avoid vehicle damage and prevent excessive stress on cable connections.
- Disconnect batteries once fully charged and avoid overnight charging whenever possible.
- Place fire extinguishers near charging stations for quick access.
- Keep combustible materials at least 3 feet away from battery chargers and electric vehicles.

*References: NFPA 88A – Standard for Parking Structures (2023 Edition); NFPA 70 – National Electric Code (2023 Edition)*



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