

Emerging Risk: Storage and Handling of EV Batteries



Please route to:

- Dealer principal
- General manager
- F&I manager
- Sales manager
- Service manager
- Office manager

Electric Vehicle (EV) sales are on the rise and are expected to increase in the years to come. In February 2023 the Bureau of Labor Statistics (BLS) stated that electric car sales in the United States increased from a mere 0.2 percent of total car sales in 2011 to 4.6 percent in 2021.¹ And S&P Global Mobility forecasts that electric vehicle sales in the United States could reach 40 percent of total passenger car sales by 2030, and more optimistic projections foresee electric vehicle sales surpassing 50 percent by 2030.²

As EV popularity grows and numbers rise, more and more of them will be visiting your service departments and landing on your pre-owned lots. Ultimately these 'large format' EV batteries will need to be repaired or replaced, thus dealerships must be prepared for their safe handling and storage. OEMs are the best source of information about EV battery repair, replacement safe handling, and storage. The purpose of this article is to provide high-level guidance to help you protect your buildings and property from fire and share additional.

Handle with care

The issue of electric battery safety, storage, and repair is relatively new and is a continuously evolving risk for dealerships. Most full EVs are still 'young' in vehicle years and their batteries are still strong and in good working order, however, as EV batteries age, more will fail prematurely, sustain damage in collisions, or simply wear out. Dealerships must be educated and prepared to move, handle, and store them.

'Large Format' lithium-ion batteries such as those found in EVs can weigh between 1,000 and 2,000 pounds. Heavy-duty equipment including jacks, lifts, forklifts, and other OEM-specific accessory equipment will be needed to remove old batteries and install new ones. Moving them within your facility will take planning.

Assign specific service stalls where EVs can be worked on safely. These stalls should be somewhat isolated from high traffic and other areas where hazardous tasks are performed – like welding, cutting, flammable liquid storage or transfer, and so on. EV work stalls

(and charging stations) should be located close to overhead doors or exits to allow access by responding fire departments. Ideally, EV work stalls should be cut off with at least a 1-hour fire-rated separation from other building occupancies to reduce the potential fire and smoke damage to other building areas.

Safe storage

Because EVs are in early stages of adoption, receiving, storing and shipping EV batteries is not a common practice for many dealerships. However, in the coming months and years, these activities are sure to become part of the dealerships' daily protocol. EV batteries will move in and out of the service department, parts, and body shop. And since they are heavy and take up a great deal of space, the time to start planning for their storage is now.

Upon being accepted by the parts team, incoming batteries will need a holding place until they can be installed in a vehicle. Defective, depleted, or damaged batteries will need a short-term storage area. Some situations may require long-term storage arrangements. Once a bad battery has been replaced, it is best to crate it up and ship it out the same day to avoid storing the battery overnight and exposing the dealership to a costly fire hazard.

Best practices are essentially the same for all storage situations:

- First, avoid storing defective, damaged, or depleted EV batteries. Return defective batteries to the OEM as quickly as possible, following their packing and shipping instructions.
- Move all EV battery storage out of and away from your primary facilities. The idea is to separate the fire hazard from high-valued property. It is critical to protect your primary business assets (showroom, parts, service department, and body shop) from loss.
- All storage facilities and areas should be equipped with automatic sprinkler systems. Until NFPA 13, Standard for the Installation for the Installation of Sprinkler Systems, includes guidance for the storage of lithium-ion batteries, consider the following guidance³:

Best practices continued

For piled storage not exceeding 5 feet tall under a 30-foot ceiling, provide sprinklers designed for an Extra Hazard Group 1 occupancy in accordance with NFPA 13-2023. Keep the piled storage at least 10 feet from other combustibles. Limit batteries to those not exceeding a 60% state of charge.

For racked storage, provide in-rack sprinklers in accordance with Option 1 of NFPA 13-2023, Section 25.6 (Sprinkler Protection Options Independent of Ceiling-Level Sprinklers).

- Consult with the OEM regarding Lithium-ion battery storage practices. General guidance is that Lithium-ion batteries should be stored at a maximum of a 50% charge level.
- Maintain at least 10 m (33 ft) of separation between EV battery storage and charging areas, and any combustible materials.

Increased hazard when wet

Flooded, damaged, or compromised EV batteries represent an increased fire risk. A short circuit inside the battery can result in a discharge of energy and heat, which can lead to a “thermal runaway”. When these batteries catch fire, they burn intensely hot and are much more difficult to extinguish than a traditional car fire. Assess your storage facilities for flood and water issues and use extreme caution.

If your facility is prone to flooding, especially in coastal areas where seawater may enter the building, be aware EV batteries can become extremely dangerous if immersed in water. FEMA shared multiple stories about batteries catching fire following recent hurricanes and flooding in Florida - (Electric Vehicle Fires Caused by Salt Water Flooding (fema.gov)).

The NHTSA offers the following guidance for flooded vehicles: the batteries in hybrid and electric vehicles are highly corrosive and should not be exposed to standing water. Flooded vehicles may have high voltage and short circuits that can shock and cause fires.

Do not park a damaged vehicle with a lithium-ion battery in a garage or within 50 feet of your house or other structure, another vehicle, or combustibles. (Hurricane- and Flood- Damaged Vehicles | NHTSA; What should I do if the battery in my electric vehicle got wet?)

The transition from fossil fuels to all-electric vehicles offers new challenges and unforeseen risks. Dealers should be in constant communication with their OEMs as new technology, policies, and procedures emerge. Moving forward, cautiously, in this new environment is our best advice.

Additional Resources

- U.S. Bureau of Labor Statistics, Charging into the future: the transition to electric vehicles : Beyond the Numbers: U.S. Bureau of Labor Statistics (bls.gov)
- National Highway Transportation Safety Administration guidance for first responders: 811575-interimguidehev-hv-batt_lawenforce-ems-fireddept-v2.pdf (nhtsa.gov)
- Interim Guidance for Electric and Hybrid-Electric Vehicles Equipped with High Voltage Batteries (U.S. Dept of Transportation; National Highway Traffic Safety Administration) interimguide_electrichybridvehicles_012012_v3.pdf (nhtsa.gov)

1. Data includes plug-in hybrids. For more information, see “Global EV data explorer,” International Energy Agency (IEA), <https://www.iea.org/data-and-statistics/data-tools/global-ev-data-explorer>.
2. Stephanie Brinley, “EV chargers: How many do we need?” S&P Global Mobility, January 9, 2023, <https://www.spglobal.com/mobility/en/research-analysis/ev-chargers-how-many-do-we-need.html>; and Michael Wayland, “Auto executives say more than half of U.S. car sales will be EVs by 2030, KPMG survey shows,” CNBC, November 30, 2021, <https://www.cnbc.com/2021/11/30/auto-executives-say-more-than-half-of-us-car-sales-will-be-evs-by-2030-kpmg-survey-shows.html>.
3. Ditch, Benjamin, and Jaap de Vries. “Research Technical Report, Flammability Characterization of Lithium-ion Batteries In Bulk Storage.” Norwood, MA: FM Global, 2013. <https://www.fmglobal.com/research-and-resources/research-and-testing/-/media/1F9682742FCD4F7FA8939A351A5D6517.ashx>.

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The Zurich Services Corporation

Zurich Resilience Solutions | Risk Engineering

1299 Zurich Way Schaumburg, Illinois 60196-1056

800.982.5964 www.zurichna.com

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