

AAA Guide for Electric/ Hybrid Electric Vehicles

BEST PRACTICES

AAA , Technical Training and Research

Introduction

Service Providers are seeing increased service events with Electric Vehicles (EV), Hybrid-Electric Vehicles (HEV) and Plug-in Hybrid Electric Vehicles (PHEV). This guide contains some best practices to assist, in safe handling of these vehicles. The purpose of this guide is to increase awareness of some of the hazards and special procedures when handling these vehicles. Additional training, and detailed model specific procedures should be obtained and followed.

Below are the differences between the most commonly produced EV's and Hybrid vehicles.

- **Electric Vehicle (EV):** An electric vehicle uses only an electric motor(s) for propulsion.
- **Hybrid Electric Vehicle (HEV):** A hybrid electric vehicle utilizes two population sources when it operates. It uses a conventional internal combustion engine and an electric motor(s)/high voltage battery combination.
- **Plug-in Hybrid Electric Vehicle (PHEV):** A plug-in hybrid electric vehicle shares the same characteristics of both an EV and an HEV by having the ability to recharge it's batteries to a full charge an external power source such as a charging station.

SCENARIOS

As a service provider, each scenario encountered is of a unique nature. Below is a list of common scenarios found at the roadside.

- 1) General Breakdown (Jump Starts, Fuel Delivery, Tire Changes and Lockouts)
- 2) Mechanical Breakdowns (Engine/Motor Troubles, Suspension Failures and etc.)
- 3) Recovery (Driveways, Parking Lots, Highways, Waterways, etc.)
- 4) Motor Vehicle Collisions (MVC)

EV, HEV AND PHEV RESPONSE RECOMMENDATIONS

In most cases when responding to a service call, providers will know Year, Make and Model of vehicle they will be encountering and what type of equipment may be required. However, it is still the provider's responsibility to assess the situation and verify the vehicle information is correct. Below are steps to take when arriving on scene.

Arrival - Upon arrival of all scenes, the provider needs to ensure the safety of themselves, the member(s) and the motoring public by providing advanced warning and positioning the service vehicle in a safe manner that will not create a larger hazard than prior to their arrival. If arriving at the scene of a vehicle involved in a collision, the best course of action is to park out of the way while attempting to locate the official in charge.

ALL CALLS

Scene Size-up:

- 1) Approach the vehicle at a 45 degree angle to avoid getting in the path of travel.
- 2) Perform a walk-around (if can be done safely) to assess and immobilize the vehicle. To immobilize the vehicle, the provider first chocks the wheels by placing wheel chocks (lengths of 4x4 can also be used) in the front and rear of a tire, ensure the vehicle's transmission is in "Park," and finally set the park brake.
- 3) Verify the vehicle information (year, make and model), identify any vehicle badging (ex. HYBRID), potential hazards and/or obstacles that may create more complications. This is also a good time to talk to the member and get any more information that may help reach a decision on what is needed to complete the task(s).
- 4) Always assume the high voltage (HV) battery and associated components are energized and fully charged.
- 5) Physical damage to the vehicle or HV battery may result in immediate or delayed release of toxic and/or flammable gases and fire.

WARNING: HYBRID and Electric vehicles may appear to be shut down even when they are not, due to the potential lack of any engine noise.

Roadside Disablement:

- 1) Verify the vehicle ignition is off.
- 2) Remove the key (if can be located).
NOTE: Some vehicles use proximity keys and they must be taken at least 16 feet from the vehicle.
- 3) If there is any **significant** pre-existing damage to the vehicle, disconnect the 12 volt battery before transporting or providing roadside service.

WARNING: Avoid contact with any orange or blue wire harnesses and the vehicle high voltage service disconnect, as these carry high voltage. Special protective equipment and procedures are required to work around these components.



MOTOR VEHICLE COLLISIONS (MVC)

- 1) Start by performing the steps described under ALL CALLS before moving to additional steps.
- 2) Ensure the 12 volt battery has been disconnected. If not, disconnect the 12 volt battery.
- 3) If cribbing is needed, DO NOT place cribbing in a location that could crimp high voltage wires or gaseous fuel lines. Make sure to verify components before placing any cribbing against the vehicle.



WARNING: If damage is found to the high voltage (HV) batteries, avoid contact, as a significant shock hazard may exist. Contact Emergency responders.

WATER SUBMERGED VEHICLE

Hybrid, Electric and Plug-in Hybrid vehicles are designed with safe guards in the event they end up in the water. The steps taken by the manufacturers to isolate the high voltage (HV) side from the chassis has assisted in preventing a potential shock hazard from touching the vehicle's body. Due to these isolation steps taken, the system is designed to not energize the surrounding water when the vehicle is submerged. However, safe guards should always be taken.



WARNING: This scenario requires extreme caution. Consult with your company policies relating to recovery of water submerged vehicles and also consult the manufacturer's recommendations prior to making any attempts. Some manufacturers may recommend the HV system be completely discharged before removing the vehicle from water.

Best Practices:

- 1) Start by assessing the scene and verifying the vehicle before moving to additional steps.
- 2) Remain a safe distance and do not attempt physical contact with the vehicle until it is cleared by a trained First Responder.
- 3) Plan your recovery so no damage to the high voltage battery pack or components will occur.
- 4) Attempt to turn the ignition off, if possible without causing a danger to yourself and others. NOTE: It may be necessary to wait until the vehicle is safely on land and drained of water to perform any disabling procedures.
WARNING: Avoid contact with HV components, cabling, or service disconnects on a submerged vehicle.

NOTE: Water submerged vehicles may experience a situation called Microbubbling. This is a fizzing or bubbling reaction from the submerged HV battery that DOES NOT indicate a shock hazard. This is internal to the battery case and does not energize the surrounding water. When microbubbling stops, it is a sign the HV battery has been discharged.

LEAKING BATTERIES

In the event that a battery is found to be cracked and/or leaking, proper steps must be taken to prevent any electrolyte (battery fluid) from contaminating the environment.

Best Practices:

- 1) Verify leak and identify areas of contamination.
- 2) Contain leak to prevent it from being introduced into the environment.
- 3) Neutralize electrolyte with an approved neutralizing spray or powder.
- 4) Bag all contaminants in an approved container to prevent any further leaks.
- 5) Dispose of the contaminants in accordance with your SOPs and State, local and Federal Requirements.

NOTE: In the event there is extensive damage and the containment/mitigation required is more than you can safely control, immediately request first responders to be dispatched to the scene and continue with a defensive role. In this defensive role, your primary responsibility is ensuring the safety of yourself, your member, others in close proximity, and the environment to the best of your abilities by keeping everyone at a safe distance. Distance and Shielding are the primary goals to ensure everyone's safety in a defensive mode.

VEHICLE TRANSPORT

Depending on the nature of the call, manufacturers may recommend towing the vehicle on a car carrier. However, a car carrier is not the only recommended procedure for these vehicles. If there is any questions regarding how to tow or service these vehicles, it is recommended to reference the EV AND HYBRID PROCEDURES in the AAA TOWING AND SERVICE MANUAL.

VEHICLE STORAGE/IMPOUND

Due to the complexity and hazards associated with EV, HEV and PHEV's, cautions need to be taken when storing these vehicles with severe damage. Even though a vehicle may not show immediate signs, there is the potential for a delayed fire. For this reason:

- Do not store a severely damaged vehicle with a lithium-ion battery inside a structure or within 50 feet of any structure or vehicle.
- Ensure that passenger and cargo compartments remain ventilated.
- Maintain clear access to stored vehicles for monitoring and emergency response if needed.
- Review the vehicle manufacturer Emergency Response Guides. These typically list any specific instructions.

Below are some additional resources for information:

- 1) AAA Technical Information: aaacampus.aaa.biz
- 2) AAA Towing and Service Manual
- 3) National Fire Protection Association (NFPA) www.nfpa.org