TOLEDO FIRE & RESCUE DEPARTMENT

C-62 Electric and Hybrid Vehicle Emergencies

Emergency Manual

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Purpose

To identify operational tactics and considerations for electric and hybrid vehicle accidents and fires.

Policy/Procedure

Members responding to vehicular accidents and fires shall be in full turnout gear. SCBA's shall be utilized for all vehicles involved with fire.

In this procedure, the term EV (Electric Vehicle) shall include hybrid, plug-in hybrid, electric plug-in vehicle, and extended-range electric plug-in vehicle.

All EV's shall be considered as fully electrically charged and a high shock hazard.

TFRD personnel arriving on scene of a fire and/or crash related incident shall make every effort to complete the recommended seven (7) step EV protocol:

1. Identify the vehicle as an EV. If neither a Truck or Rescue Squad has not been dispatched, request their response for the EV (see step 4 below).

2. Place vehicle in park, set the parking brake and place wheel chocks. Put in Emergency EV Plug. EV Plug and Fire Blankets are located on R6, R7, T4, T5 and T17.



EV Plug



Fire Blanket

3. Access passenger compartment.

4. Turn ignition to OFF position. Be aware, this may include finding and securing proximity based keyfobs. These fobs have the potential to start or re-energize a car if within 15’ to 25’. Cell phones have potential also to start the vehicle.

5. Check that dash indicator lights and gauges shut down.

6. Disconnect or shutdown 12-volt battery. 12-volt batteries are commonly found under or behind the rear seat or in the trunk area for hybrid vehicles and under the floor pan or in the transmission hump for fully electric vehicles. Use first responder cut loops or factory identified high voltage disconnects within the vehicle to shut down the high voltage battery. Cut in two places to create a 2”-3” gap to avoid accidental restoration of power.

7. DO NOT TOUCH OR CUT ORANGE CABLES OR CONNECTORS. Orange is the industry standard for the high voltage wire.



Image of a First Responder cut loop



Image of a Factory Identified High Voltage Disconnect

The Incident Commander, along with ensuring the completion of the seven-step electrical vehicle mitigation plan, will also ensure all standing protocols and procedures for vehicle related accidents and fires are followed. This will include assigning personnel to mitigate any additional hazards that are present.

Some EV’s may have rescue data sheets placed in the sun visor area. Rescue data sheets provide

information about suggested voltage cutting locations, airbag zones, battery location, type of drive and locations of high-voltage components. Although helpful, data sheets are not a legal requirement and may not be present in all electrical vehicles.

The high voltage battery system is controlled through the low voltage battery system. Both systems should be disabled when possible. Locating and cutting the negative terminal on the low voltage location is needed to POTENTIALLY disable the system. Note that it may take up to ten (10) minutes for some electrical capacitors to fully discharge. This stranded energy can continue to pose a hazard.

It is the intent of this policy that actions taken by TFRD personnel shall conform with procedures; C-10 AUTOMOBILE FIRE, C-32 EXPRESSWAY AND TURNPIKE EMERGENCIES, C-112 VEHICLE EXTRICATION, C-61 LITHIUM-ION BATTERY

EV CRASH INCIDENTS

- A 1 3/4” attack line shall be charged and in position to extinguish prior to any involvement with an EV vehicle.
- If unusual odors or eye, nose, or throat irritation is experienced full PPE and SCBA shall be used.
- If leaking fluid, sparks, smoke, flame, gurgling or hissing sounds, increasing temperature recorded using the temp gun or thermal imager is recognized from the High-Voltage battery compartment it shall be assumed there is a battery fire. The passenger area must be ventilated and TFRD personnel shall ensure all victims and bystanders are removed from the immediate area. A 50-foot radius is recommended.
- TFRD personnel shall remain alert for the potential of delayed fire from damaged lithium-ion batteries inside or beneath the EV.
- TFRD personnel shall not pierce or cut into an EV blindly as high voltage components could bedamaged creating a severe shock hazard.
- For all operations including extrications, especially in stabilization and lifting evolutions, the high-voltage battery box shall not be used for any reason. This area must remain free of damage from TFRD operations.

What to do:

1. Evaluate scene safety concerns. This includes scene size up and establishing mitigation priorities.

2. Investigate: Identify vehicle as an EV (badging on the exterior of the vehicle is the simplest identification method or the lack of an exhaust). Use a multi-gas meter and thermal imagine camera to identify unseen hazards and document temperatures throughout the incident.

3. If the patient is in imminent danger or if chemical burns are present, they will require immediate rescue.

4. Follow the recommended seven (7) step EV protocol.

5. Check for leaking fluids. Dike or use an absorbing agent if needed.

6. Position a gas monitoring device near the patient. If there are positive readings ensure natural ventilation.

7. Continuous monitoring of the vehicles' batteries with a Thermal Imaging Camera for increased temperatures is required. If temperature increase is noted or there is an outbreak of fire the patient will need to be removed from the vehicle without delay.

8. Continue scene mitigation following applicable procedures

EV FIRE INCIDENTS

- EV fires can be separated into two categories; a vehicle fire which involves burning of combustible materials of the vehicle (i.e., seats, dash) and/or a lithium-ion battery thermal runaway fire which involves a fire within the lithium-ion battery or battery cells/modules that are typically contained within a steel box enclosure.
- If it is an EV fire that does not involve the batteries and not in thermal runaway, extinguish the fire using typical firefighting procedures.
- If it does involve the batteries and in thermal runaway, request a Battalion Chief to respond and the closest Fire Blanket if not on scene already.
    - In conjunction with the BC, consideration must be made depending on exposures and life safety issues if we just let it burn out and if HAZMAT should respond.
    - If the EV is inside or adjacent to exposures it may be appropriate to knockdown the fire, quickly attach to it and move the vehicle away from exposures.
- Lithium-ion battery fire extinguishment requires large and sustained volumes of water.
- When it is determined that extinguishment is appropriate, obtain a secure water supply to support a long-term suppression operation that may require thousands of gallons.
- There is potential for delayed ignition or rekindle of a lithium-ion battery fire after extinguishment operations have concluded. This hazard will remain until the battery is discharged by a service technician. The battery cannot be discharged at an emergency scene.

See Also:

Permanent link:
https://www.tfrdpolicies.com/dokuwiki/doku.php?id=c_manual:c62

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