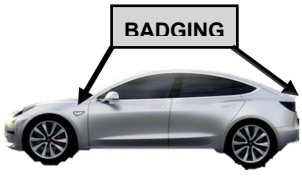
THERMAL EVENTS
First Responder Checklist for Electric Vehicle Thermal Events

Electric and Hybrid Electric Vehicles that have experienced any type of abuse – Physical, Electrical, Environmental, Thermal – should be considered high risk for a thermal event until proven otherwise. Upon arrival on scene and confirmation of electric or hybrid vehicle, **CONTACT the ESA:**

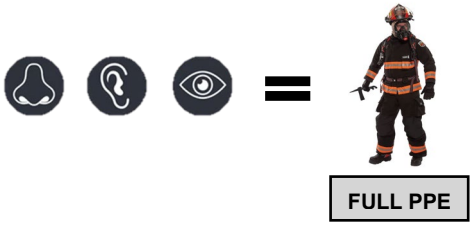
855-ESA-SAFE

- Assess the vehicle from a distance of 50' - 75' and verify that the vehicle is a hybrid or electric through badging and design features.



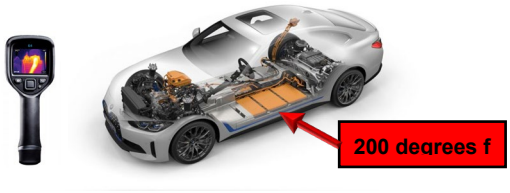
Signs of a Thermal Event

SMELL: Sweet Electrical Burning odor
SIGHT: Visible smoke, fire, leaking fluid or arcing
SOUND: Buzzing, popping, hissing



- **CALL 855-ESA-SAFE or 855-372-7233 for technical support**

- Thermal Imaging Cameras should be deployed as well to identify any hot spots associated with the battery pack. Temperatures above 200 degrees f is a probable indicator of impending thermal runaway. Camera targets should be the battery pack and high voltage components. The ESA agent will assist you in identifying the unique locations of all components.

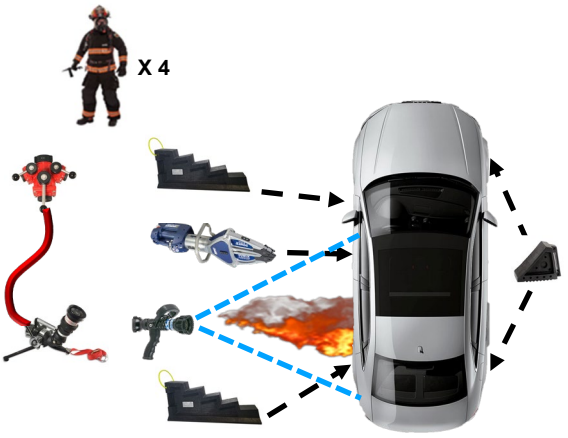


- Smoke (GAS) produced from Li ion batteries contains Hydrogen, Hydrogen Flouride, Carbon Monoxide, Carbon Dioxide, as detectable gasses. Gas production is flammable, explosive, and toxic. Firefighters should wear full PPE including SCBA when interacting with vehicles presenting a thermal event. 4 Gas Meters should be deployed to help identify hazard levels for atmospheric management and isolation zones.

- All Electric and Hybrid Electric vehicles present potential arc flash and electrical risks. **DO NOT** make contact with any High Voltage components. These include the battery pack, orange cables, and any electrical appliances with the High Voltage triangle badge. The ESA agent will help identify the locations of these hazards.

- If exposures can be protected and there is no immediate life safety concern, allow the vehicle to burn and **DO NOT ATTEMPT SUPPRESSION.**

- **IF SUPPRESSION IS CHOSEN:**
  - Apply wheel chocks to the wheels on the least involved side of the vehicle
  - Identify the vent point(s) of the main body of fire and gas.
  - Deploy attack line and apply straight to wide fog pattern to protect rescuer access points.
  - Lift the vehicle with hydraulic spreaders (battery operated preferably) at the balance point of the vehicle under the rocker panel.
  - Capture lifting progress with stacked step chocks and cribbing.
  - Lower the vehicle onto the chocks and withdraw rescuers while protecting with attack line.
  - Lay 2” – 3” supply line to water thief or gated wye and extend with additional section of 2” – 3” to ground monitor equipped with fog nozzle.
  - Position portable ground monitor under the vehicle and directed at the primary vent point.
  - Control flow of water with gate valve at the water thief or wye and apply water through the vent point to the interior of the battery enclosure. Direct cooling is paramount. Indirect cooling to the exterior pack enclosure will be largely ineffective.
  - Consider Evacuation of immediate exposed areas downwind if gas plume extends and is sampled as hazardous.
  - **FREE BURNING WILL REDUCE TOXIC GASSES.**



1. **PROTECT**: Attack Line
2. **LIFT**: Spreader
3. **CAPTURE**: Steps and Cribbing
4. **SOAK**: Ground Monito Nozzle

- Validate effective suppression through Thermal Imaging and 4 Gas monitoring. CO levels should be minimal and battery temp should be cooled until temp is at or below 200 degrees f. Vehicle should be monitored for 45 minutes before releasing to second party in chain of custody.

- Tow companies **MUST COMPLETE A RISK ASSESSMENT** with the **ESA** prior to loading and transport.

- Fire Department is strongly encouraged to escort tow transport to storage/staging area.

- Vehicles MUST be isolated for storage according to ESA guidelines and positioned a minimum of 50’ away from all combustibles and exposures.

- Place an ESA LEVEL RED (Risk Assessment Placard) Sticker on the vehicle as directed per the ESA.

ESA support services are provided free of charge to tow operators and first responders