

Emergency Services Guidance for Competition Electric Vehicles

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Purpose

Provide Race Track Emergency Response personnel with guidance to handle the unique requirements when responding to unplanned incidents such as vehicle fire, High Voltage battery fire, and crash involving **competition electric vehicles**.

NOTE

Unmodified production electric vehicle incidents should be handled according to National Highway Traffic Safety Administration (NHTSA) procedures or the manufacturer's recommended emergency procedures.

Summary

The major unique safety considerations for competition electric vehicles center around a fire in the battery pack and hazards related to High Voltage wiring:

1. If an incident occurs while the vehicle is stationary, immediately disconnect all external power and any other wiring that may be connected to the vehicle.
2. Be advised that the vehicle owner, if present, can be a valuable information resource.
3. Be aware that High Voltage is present.
4. Avoid battery packs and exposed wiring as they may present shock hazards.
5. Battery pack damage or fire may result in the emission of toxic and flammable vapors.
6. Battery pack fires may be self-fueling and inextinguishable.
7. Use a hose line to apply copious amounts of water to cool the battery pack and prevent the spread to adjacent cells.
8. If a hose line is not available or water supply is depleted, use defensive tactics and allow the fire to burn out.

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Introduction

The National Electric Drag Racing Association (NEDRA) is committed to ensuring the highest standards of safety on any track with competition electric vehicle participants. In order to better protect drivers, crew members, spectators, and emergency service responders at these race venues, a set of recommended **Best Practices** have been developed. These procedures are applicable for emergency, unplanned events such as a vehicle fire, High Voltage battery fire, crash, or other incident involving custom built competition electric vehicles.

NOTE

Unmodified production electric vehicle incidents should be handled according to National Highway Traffic Safety Administration (NHTSA) procedures or the manufacturer's recommended emergency procedures.

NEDRA does not believe that competition electric vehicles present a greater risk of post-crash fire than gasoline-powered vehicles. In fact, all vehicles—both electric and gasoline-powered—present some risk of fire in the event of a serious crash. However, electric vehicles have specific attributes that should be made clear to all involved drivers, crew members, the emergency response community serving the venue, as well as tow truck operators and storage facilities. Out of an abundance of caution to prevent injury and loss of property, these guidelines identify considerations and actions for all competition electric vehicles, especially those that have battery packs utilizing lithium-based battery chemistries.

Fire & Rescue Personnel

SAFETY ADVICE

In the event of damage to or fire involving a competition electric vehicle:

1. The vehicle owner, if present, can be a valuable information resource for emergency response teams since competition electric vehicles are custom built.
2. Always assume the High Voltage (HV) battery and associated components are energized and fully charged.
3. Be aware the competition electric vehicles may have more than one battery pack **AND** it may not be located in the immediate proximity of other battery packs.
4. **Do NOT** remove the cover to a High Voltage battery pack.
5. Exposed electrical components, wires, and HV batteries present potential HV shock hazards.
6. Venting/off-gassing HV battery vapors are potentially toxic and flammable.
7. Physical damage to the vehicle or HV battery may result in immediate or delayed release of toxic and/or flammable gases and fire.

WARNING

A delayed fire can occur **hours** or **days** after the initial incident.

IDENTIFY VEHICLE

Race Control shall advise all responders when an incident involves an electric vehicle.

NOTE

The procedure for notifying responders that a trackside incident involves an electric drive vehicle should be fully explained to all responders of all disciplines who might respond to such an incident, i.e. fire, medical, law enforcement, security, safety, tow & recovery, etc. prior to the start of any activities involving electric-powered vehicles.

IMMOBILIZE and DISABLE VEHICLE

1. If an incident occurs while the vehicle is stationary, immediately disconnect all external power and any other wiring that may be connected to the vehicle.
2. Always approach the competition electric vehicle from the sides to stay out of potential travel path. It may be difficult to determine if the vehicle is running due to lack of engine noise.
3. If possible, chock or block the drive wheel tires.
4. If not performed by the owner, use the master cutoff switch on the rear of the vehicle to turn off the High Voltage.

CAUTION

Although the High Voltage is removed from the traction control circuits,
High Voltage may be still be present for up to 5 minutes
AND
High Voltage is always present at some locations in the vehicle.

CRASH

1. If you detect leaking fluids, sparks, smoke, flames, increased temperature, gurgling or bubbling sounds from the HV battery compartment, assume there is a battery fire and ventilate the passenger area (i.e., roll down windows, or open doors).
2. If there is fire, and the driver is still inside the vehicle, a fire extinguisher may be used to protect the driver until a hose line is available or until the driver is removed.
3. Request Emergency Medical Services if there are injuries as a result of the crash.
4. Move away from the vehicle and evacuate others from the immediate area if you detect any unusual odors or experience eye, nose, or throat irritation.
5. Wear full Personal Protective Equipment (PPE) and Self-Contained Breathing Apparatus (SCBA) if rapid extrication is necessary for injured or trapped driver.
6. Be alert. There is a potential for delayed fire with a physically damaged lithium-ion batteries; i.e. crash damage, exposure to heat or fire, etc.

WARNING

A delayed fire can occur **hours** or **days** after the initial incident.

FIRE

NOTE: Competition electric vehicle fires must be attacked with the appropriate available fire suppression equipment. If the vehicle is occupied, initial fire suppression may be conducted using a dry chemical fire extinguisher to protect the driver. The recommended practice is to suppress all fire with a water stream from a hose line supplied by a response vehicle with an adequate water supply on board.

If the competition electric vehicle fire origin is determined to be a High Voltage, lithium-ion battery pack, successful suppression will require a large, sustained volume of water for safe and effective extinguishment. If there is no immediate threat to life or property and an adequate supply of water is not readily available for suppression, responders should consider defensive tactics and allow the High Voltage battery fire to burn itself out.

1. All suppression personnel within the immediate proximity of a burning High Voltage competition electric vehicle should wear appropriate Personal Protective Equipment (PPE) and Self Contained Breathing Apparatus (SCBA) at all times.
2. SCBA should not be removed until the fire is confirmed completely extinguished and all sources of heat, smoldering, and ignition have been completely controlled and cooled.
3. If the driver is still inside a burning competition electric vehicle or is physically trapped due to a crash incident, track responders can consider using a portable hand-held fire extinguisher initially to protect the driver until a water hose line is available or until the driver is removed. Said fire extinguisher should be a minimum 10# capacity A-B-C dry chemical-type unit with a rating of a minimum of 2A-10B-C.
4. As with any vehicle fire, the byproducts of combustion can be toxic. Response personnel and others on scene but without appropriate PPE, not properly trained or not properly equipped to fight the fire should remain a safe distance upwind and uphill of an electric vehicle fire. The distance should allow these individuals to remain clear of any airborne contaminants, smoke, and fumes.
5. Establish a safe perimeter around the vehicle, clearing all non-emergency track personnel from the downhill, downwind side of the incident.
6. Consider establishing a water supply to support long-term fire suppression operations.
7. Use a hose line to apply water to extinguish the fire while continuing to cool the HV battery and its casing. Never attempt to penetrate the HV battery or its casing to apply water into or onto the battery cells of the High Voltage battery.
8. Avoid contact with all large gauge (greater than ¼ inch diameter) cabling, connectors, or electronic units and areas identified as a High Voltage risk with caution or hazard warning labels.
9. Be alert. There is a potential for delayed ignition or re-ignition of a lithium-ion battery fire even after it is believed to be extinguished. This may remain an issue until the lithium-ion battery is properly discharged.

WARNING

A delayed fire can occur **hours or days** after the initial incident.

POST-INCIDENT

Vehicle should be monitored for leaking fluids, sparks, smoke, flames, gurgling or bubbling sounds from the HV battery, and if detected, assume the HV battery is burning and follow above guidance to extinguish the fire.

WARNING

Any battery residue, internal materials, and damaged battery packs should only be handled using **hazardous materials** handling guidelines.

Emergency Medical Services

In the event of damage to or fire involving a competition electric vehicle (EV) where the incident has resulted in possible personal injury(i.e. Driver):

1. Always assume the High Voltage (HV) battery and associated components are energized and fully charged.
2. Exposed electrical components, wires or HV batteries present potential HV shock hazards.
3. Venting/off-gassing HV battery vapors are potentially toxic and flammable to both you, the driver, competition team crew members, and all responder personnel.
4. Always approach a competition electric vehicle from a side to stay out of potential travel path. It may be difficult to determine if the vehicle is ON due to lack of engine noise.
5. Ensure that driver area and any cargo compartments remain well ventilated, i.e., open window, door or trunk when inside vehicle providing patient care.
6. If you detect leaking fluids, sparks, smoke, flames, increased temperature, gurgling, popping or hissing noises from the HV battery compartment, ventilate passenger area (i.e., roll down windows or open doors) and request fire department response.
7. Move away from the vehicle and evacuate others from the immediate area if you detect any unusual odors or experience eye, nose, or throat irritation. Rapid extrication may be needed for injured or trapped occupants.
8. Remain a safe distance upwind and uphill from the vehicle until other appropriately equipped emergency responders arrive.
9. Be alert. There is a potential for delayed fire with damaged lithium-ion batteries.

WARNING

A delayed fire can occur **hours** or **days** after the initial incident.

Vehicle Owner

In the event of damage to or fire involving a competition electric vehicle (EV):

1. Always assume the High Voltage (HV) battery and associated components are energized and fully charged.
2. Potential HV shock hazards may exist even if visible wires and HV batteries do not reveal any damage.
3. Venting/off-gassing HV battery vapors are potentially toxic and flammable.
4. Physical damage to the vehicle or HV battery may result in immediate or delayed release of toxic and/or flammable gases and fire.

WARNING

A delayed fire can occur **hours** or **days** after the initial incident.

5. If an incident occurs while the vehicle is stationary, immediately disconnect all external power and any other wiring that may be connected to the vehicle.
6. If the incident occurs while driving, move the vehicle to a safe area 50 feet away from any structures or other vehicles if possible.
 - Roll down windows before shutting the vehicle off.
 - Place the vehicle in Park and set the parking brake.
 - Exit the vehicle, if possible.
7. If possible, use the master cutoff switch to disable the vehicle.
8. Remain a safe distance upwind and uphill from the vehicle fire while monitoring the status and condition of the vehicle and its High Voltage battery and electrical system.
9. Do not touch exposed electrical components or the motor compartment, as a shock hazard may exist.
10. Avoid contact with leaking fluids and gases.
11. Notify the on-track emergency response team ASAP.
12. Standby to advise emergency response team as needed.

Towing and Recovery Operators - Vehicle Storage Facilities

In the event of damage to or fire involving a competition electric vehicle (EV):

1. Always assume the High Voltage (HV) battery and associated components are energized and fully charged.
2. Exposed electrical components, wires, and HV batteries present potential HV shock hazards.
3. Venting/off-gassing HV battery vapors are potentially toxic and flammable.
4. Physical damage to the vehicle or HV battery may result in immediate or delayed release of toxic and/or flammable gases and fire.
5. Be alert. There is a potential for a delayed fire with damaged lithium-ion batteries.

WARNING

A delayed fire can occur **hours** or **days** after the initial incident.

RECOVERING /TRANSPORTING VEHICLE

1. Consult with competition electric vehicle owner to verify that the competition electric vehicle is turned off and disabled.
2. Avoid contact with the interior of the vehicle.
3. Avoid contact with any exposed wiring. If there is any exposed wiring hindering securing the vehicle for transport, ask the vehicle owner to take corrective action.

STORING VEHICLE

1. Do not store a severely damaged vehicle with a lithium-ion battery inside a structure or within 50 feet of any structure or vehicle.
2. Ensure that driver and cargo compartments remain ventilated.
3. Prior to placing and while located in storage area, continue to inspect vehicle for sparks, smoke, flames, gurgling or bubbling sounds from the vehicle.
4. If any of these conditions are detected, immediately notify appropriate personnel:
 - If the vehicle is stored at the track, notify track emergency response officials.
 - If the vehicle is at another location, call 911.
5. Maintain clear access to stored vehicles for monitoring and emergency response if needed.