
	POLK COUNTY FIRE RESCUE	STANDARD OPERATING GUIDELINES
	Operation Order Number: 647	Revised: 3/14/2024 Next Revision: Lexipol 2024
	Subject: Electric Vehicle Fires	Page: 1 of 5
	Associated Directives:	Rescinds:
Application:	Accreditation Standards:	Authorized By:  <small>Hezedeane Smith (Jun 24, 2024 18:14 EDT)</small> Dr. Hezedeane Smith, Fire Chief

PURPOSE

To establish operational guidelines for effective response, mitigation, and safe operational procedures for electrical vehicle fires.

SCOPE

This policy shall apply to all sworn Polk County Fire Rescue (PCFR) personnel.

AUTHORITY

The Fire Chief authorizes the information within this policy.

DEFINITIONS

Hybrid Vehicle: Hybrid vehicles are vehicles that use both battery power and some other form of flammable or combustible liquid or gas the most common being gasoline.


Fully Electric Vehicle: A fully electric vehicle uses only battery power to operate.

Thermal Runaway: Lithium-ion (Li-ion) battery thermal runaway occurs when a cell, or area within the cell, achieves elevated temperatures due to thermal damage, mechanical damage, internal/external short-circuiting, or electrochemical abuse. This elevated temperature releases energy which in turn further increases the temperature. It is a phenomenon known as a positive feedback loop in which the lithium-ion cell enters an uncontrollable, self-heating state.

647.1 **POLICY**

A. All Electric Vehicle Types


- (1) Identify the type and model of vehicle if possible and locate where the batteries are and how to best shut down the vehicle if possible. Special Operations has Crash Recovery and can identify batteries and high voltage lines through computer app. Units can ask for this information by giving vehicle make and model.
- (2) Be prepared to use more water for electric vehicle fires and note that fires could also be burning inside one of the protective compartments, invisible to the first responder. Extensive on scene time is required due to amount of water needed to extinguish fire, make sure water supply is established and/or tenders are enroute.

	POLK COUNTY FIRE RESCUE	STANDARD OPERATING GUIDELINES
	Operation Order Number: 647	Revised: 3/14/2024 Next Revision: Lexipol 2024
	Subject: Electric Vehicle Fires	Page: 2 of 5
	Associated Directives:	Rescinds:
Application:	Accreditation Standards:	Authorized By: Dr. Hezedeane Smith, Fire Chief


- (3) High voltage battery fires may take much longer to suppress and extinguish when compared to more conventional fires (4 hours min.). If possible, with no other hazards allow fires to burn and self-extinguish, this is the most effective manor to prevent reignition.
- (4) Be aware of the possibility that a lithium-ion battery fire could reignite. If not entirely discharged, the stored energy inside the battery could cause a second or even third fire.
- (5) Keep electric vehicles that have been in an accident away from buildings or other structures because of the possibility of re-ignition. If necessary, call for the use of a tow truck or battalion truck to wench the vehicle to safety away from the structure to prevent further extension of the fire.
- (6) Understand that electric vehicles are silent and may still be on even if it's not audible. The voltage from the vehicle could shock a first responder.
- (7) Always wear SCBA when dealing with a lithium-ion battery fire as some vehicles can emit toxic vapors.
- (8) Extinguish small fires that do not involve the high voltage battery using typical vehicle firefighting procedures.

B. Hybrid Vehicle Fires

- (1) Ensure all personnel are wearing full PPE including SCBA
- (2) If safe, chock the wheels
- (3) Never assume the vehicle is powered off and won't move
- (4) Immediately check for trapped victims
- (5) Avoid the smoke whenever possible
- (6) Attack the fire as a normal vehicle fire as the batteries may not be involved
- (7) After confirming the vehicle is a hybrid vehicle and the batteries are involved, notify incoming units of lithium-ion battery fire
 - (a) If safe to do so, allow the batteries to burn, evacuate the area 330' in all directions, and protect exposures
 - (b) If extinguishment is required, secure a continuous water supply
 - (c) Extinguishment may require copious amounts of water likely in the thousands of gallons


	POLK COUNTY FIRE RESCUE	STANDARD OPERATING GUIDELINES
	Operation Order Number: 647	Revised: 3/14/2024 Next Revision: Lexipol 2024
	Subject: Electric Vehicle Fires	Page: 3 of 5
	Associated Directives:	Rescinds:
Application:	Accreditation Standards:	Authorized By: Dr. Hezedeane Smith, Fire Chief

- (i) Consider one or more water tenders in areas not serviced by fire hydrants
- (ii) Consider relocating the vehicle to a safer area if possible and safe to do so
- (8) Locate the main lithium-ion battery
 - (a) Refer to the Emergency Response Guide for the specific make and model of the vehicle for guidance. Guides may be found at www.nfpa.org
 - (b) A thermal imager should be used to check the temperature of the lithium-ion battery and cooling measures should be used if necessary
 - (c) Apply water as directly to the batteries as possible
 - (i) Most vehicles will have the batteries underneath the vehicle and the vehicle may need to be raised and/or hose line tactics adapted (underbody spray)
 - (d) Once extinguished, if it is possible, locate the main disconnect to isolate power to the main lithium-ion battery
 - (e) This can be done by removing the negative terminal from the 12-volt battery and cutting the first responder loop
- (9) Never cut, crush, puncture, or open a high-voltage battery to extinguish it
 - (a) If the cells are visible due to damage you can direct a hose stream directly on the cell
 - (b) Observe the battery and listen for smoke, steam, and popping noises from the battery
 - (c) If any of these are observed, the lithium-ion battery is in thermal runaway
- (10) Once the lithium-ion battery has been cooled, stand by for at least one hour and continue monitoring the lithium-ion battery using the thermal imager and observe for any other signs of thermal runaway (e.g., steam, hissing, popping, etc.)
 - (a) If on a highway, consider using a tow vehicle move the vehicle out of the way, if feasible and safe
 - (b) Once determined the vehicle is safe for transport, release the vehicle to the tow company, making sure it's towed on a flatbed. Wheel Lift towing may send unwanted power to the lithium-ion batteries
 - (c) The tow company is responsible for properly storing the vehicle

	POLK COUNTY FIRE RESCUE	STANDARD OPERATING GUIDELINES
	Operation Order Number: 647	Revised: 3/14/2024 Next Revision: Lexipol 2024
	Subject: Electric Vehicle Fires	Page: 4 of 5
	Associated Directives:	Rescinds:
Application:	Accreditation Standards:	Authorized By: Dr. Hezedeane Smith, Fire Chief

C. Fully Electric Vehicles

- (1) If you encounter an electric vehicle fire that is attached to a charger, you must take this into consideration when you size up the scene. Best practices recommend shutting down power at the charging cabinet first, then continuing with immobilizing and disabling the vehicle if possible.
- (2) Ensure all personnel are wearing full PPE including SCBA
- (3) If safe, chock the wheels
- (4) Never assume the vehicle is powered off and won't move
- (5) Immediately check for trapped victims
- (6) Avoid the smoke whenever possible
- (7) Use a minimum of a 1 ¾ inch hose line to extinguish the fire
 - (a) Foam is not recommended
- (8) Attack the fire as you would a normal vehicle fire
- (9) After confirming this is an electric vehicle (EV) and the batteries are involved, notify incoming units of lithium-ion battery fire
 - (a) If safe to do so, allow the batteries to burn, evacuate the area 330' in all directions, and protect exposures
 - (b) If extinguishment is required, secure a continuous water supply
 - (c) Extinguishment may require copious amounts of water likely in the thousands of gallons
 - (i) Consider one or more water tenders in areas not serviced by fire hydrants
 - (ii) Consider relocating the vehicle to a safer area if possible and safe to do so
 - (d) Most vehicles will have the batteries underneath the vehicle and the vehicle may need to be raised and/or hose line tactics adapted (underbody spray)
- (10) Consider requesting assistance with tilting the vehicle to gain access to the underside of the vehicle where the floor pan lithium-ion battery is located, if necessary, to gain access to the battery pan
- (11) Refer to the Emergency Response Guide for the specific make and model of the vehicle for guidance on securing power to the lithium-ion battery. Some battery cooling mechanisms are powered by the 12-volt system. Guides may be found at

	POLK COUNTY FIRE RESCUE	STANDARD OPERATING GUIDELINES
	Operation Order Number: 647	Revised: 3/14/2024 Next Revision: Lexipol 2024
	Subject: Electric Vehicle Fires	Page: 5 of 5
	Associated Directives:	Rescinds:
Application:	Accreditation Standards:	Authorized By: Dr. Hezedeane Smith, Fire Chief

www.nfpa.org

- (12) If any lithium-ion cells have come out of the battery and lying on the ground request HazMat
 - (a) Do not touch any battery that has come out of the battery compartment
- (13) Use a thermal imager to check the temperature of the lithium-ion battery
 - (a) Cool with a continuous water stream
- (14) Never cut, crush, puncture, or open a high-voltage battery to extinguish it
 - (a) If the cells are visible due to damage you can direct a hose stream directly on the cell
 - (b) Observe the battery and listen for smoke, steam, and popping noises from the battery
 - (c) If any of these are observed, the lithium-ion battery is in thermal runaway
- (15) Once the lithium-ion battery has been cooled, stand by for at least one hour and continue monitoring the lithium-ion battery using the thermal imager and observe for any other signs of thermal runaway (e.g., steam, hissing, popping, etc.)
 - (a) Once determined the vehicle is safe for transport, you can release the vehicle to the tow company, making sure it's towed on a flatbed. Wheel Lift towing may send unwanted power to the lithium-ion batteries
 - (b) The tow company is responsible for properly storing the vehicle

D. Post Incident

- (1) Brief the towing company and their personnel on the hazards, including providing 50' clear space around the vehicle once stored and never inside a building.
- (2) Fire hose and turn-out cleaning should follow current post-fire incident decontamination procedures.

- End of SOG -






SOG 647 Electric Vehicle Fires

Final Audit Report

2024-06-24

Created:	2024-06-24
By:	Michael Linkins (michaellinkins@polk-county.net)
Status:	Signed
Transaction ID:	CBJCHBCAABAAASGW9DRXO1L-aCxjdTax7JjuYPzdE0G_

"SOG 647 Electric Vehicle Fires" History

-  Document created by Michael Linkins (michaellinkins@polk-county.net)
2024-06-24 - 8:39:31 PM GMT
-  Document emailed to Hezedeane Smith (hezedeane@polk-county.net) for signature
2024-06-24 - 8:39:56 PM GMT
-  Email viewed by Hezedeane Smith (hezedeane@polk-county.net)
2024-06-24 - 10:14:32 PM GMT
-  Document e-signed by Hezedeane Smith (hezedeane@polk-county.net)
Signature Date: 2024-06-24 - 10:14:40 PM GMT - Time Source: server
-  Agreement completed.
2024-06-24 - 10:14:40 PM GMT