APTIV

Chrysler Pacifica Platform
First Responder Interaction Plan

V 1.1

Introduction

The purpose of this document is to provide first responders with information needed to safely interact with a Chrysler Pacifica outfitted with an Aptiv Automated Driving System (ADS).

This guide is meant to highlight the differences between an Aptiv-ADS-equipped Pacifica and a conventional Chrysler Pacifica.

Standard safety measures that apply to a non-ADS equipped vehicle should be carried out in accordance with the *FCA 2017 Pacifica Hybrid Emergency Response Guide*.

Full, longform link: https://www.nfpa.org/-/media/Files/Training/AFV/Emergency-Response-Guides/Chrysler/Chrysler-Pacifica-PHEV-2017-2018-ERG.ashx?la=en

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Emergency Contact Information

The point(s) of contact for all vehicle-related incidents are vehicle operators. Each vehicle will always have at least one certified vehicle operator.

In the event vehicle operators are not able to act as the Aptiv point of contact, first responders may contact Aptiv at:

Boston, MA

Sam Bernardon:

Mauro Aguiar:

Pittsburgh, PA

Jonathan Dailey

Justin Williams:

Las Vegas, NV

Neil Brennan:

Zeb Dawson:

Singapore

Matthias Sapuan:

Joseph Batchelor:

Vehicle Identification

The Aptiv autonomous vehicle is a modified Chrysler Pacifica. These vehicles are easily identified by “Aptiv” decals on both sides of the vehicle and on the engine hood. Individual vehicles are identified by license plate(s) and other jurisdiction-specific identifiers.

Vehicle Registration and Insurance

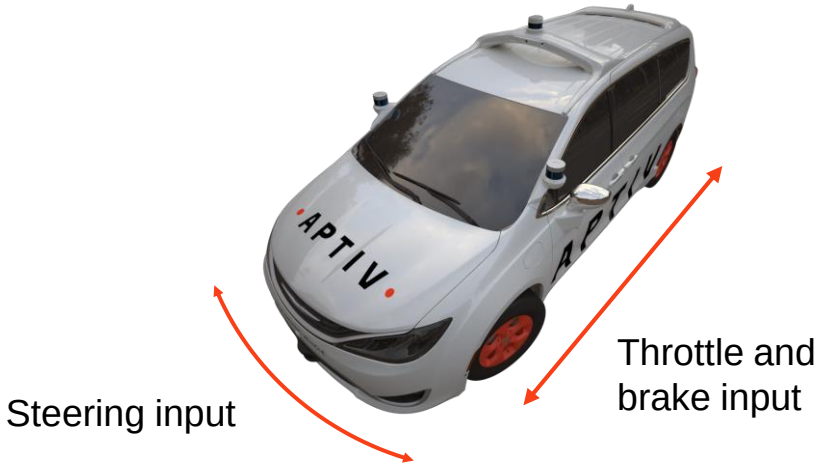
Vehicle registration and insurance information, along with a copy of this guide, are located in the passenger glove compartment.

Autonomous Capabilities

The Aptiv Automated Driving System is capable of controlling the steering, throttle, and brake as well as various other vehicle functions while operating within designated, pre-mapped areas.

When the Aptiv Automated Driving System is generating control inputs to the vehicle without manual input, the vehicle is said to be in autonomous (auto) mode.

When the Aptiv Automated Driving System is disengaged, the vehicle can be driven normally.



Disengaging the Aptiv Automated Driving System

Shift and Parking Brake Indicators

The gear shift is located on the center console, to the right of the steering wheel. The vehicle is in park when the blue indicator is lit above the “P”.

The vehicle automatically turns on the parking brake when the vehicle is in park **and** any door is open. This is indicated by a red light.

These are standard, non-ADS procedures. See the FCA guide for more details.

Disengaging Autonomous Mode

Autonomous mode can be disengaged by any of the following actions:

+ pressing the RES button on the steering wheel
+ pressing the brake pedal
+ pressing the throttle pedal
+ manually turning the steering wheel
+ turning the vehicle off

Verifying Autonomous Mode Disengagement

Autonomous mode is disengaged if:

Vehicle is in park

Indicated by a lit blue indicator above the ‘P’ on the center console

OR

If cruise control is off

Indicated by the *absence* of a green speedometer symbol in the upper, right-hand corner of the driver-side dashboard

Turning the Vehicle Off

Turn the vehicle off by pressing the ignition button, located to the right of the steering wheel.

RUN indicates the car is **ON**

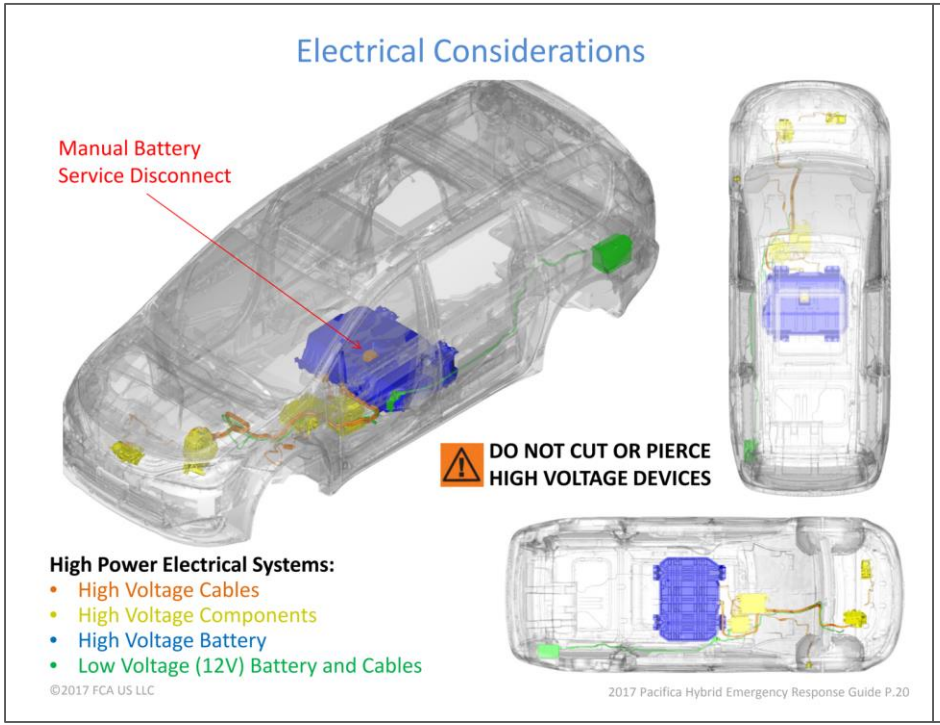
OFF indicates the car is **OFF**

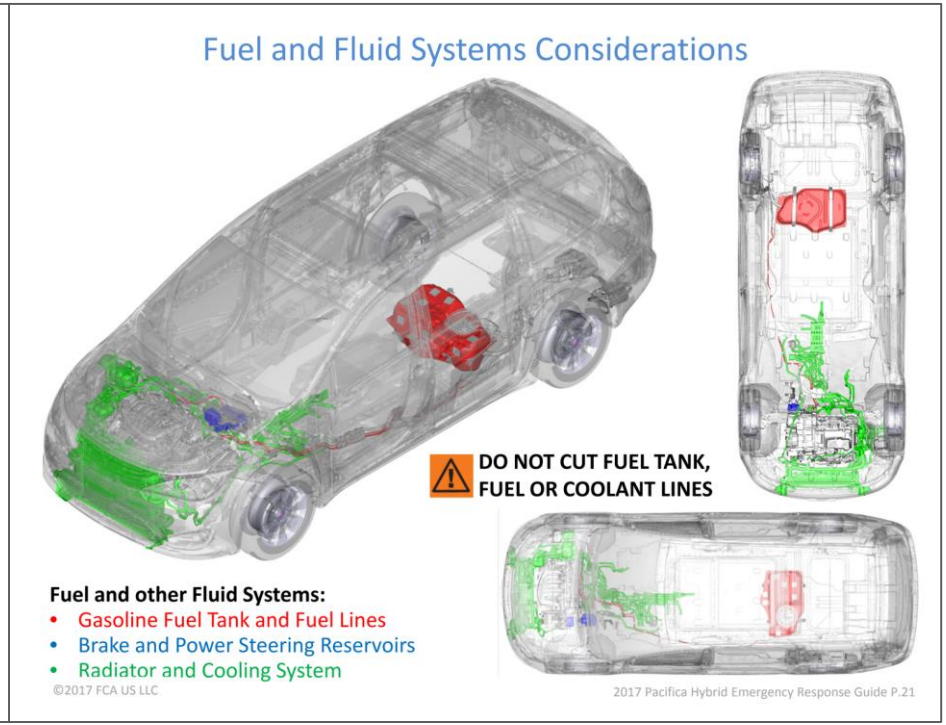
In the event that the ignition switch does not turn off the vehicle, a 12V low power loop can be disconnected either under the engine hood or in the vehicle trunk.

These are standard, non-ADS procedures. See page 14 through 17 for more detail and electrical disconnect information.

Vehicle Electrical Systems

OEM Vehicle Electrical Systems





Excerpt from FCA guide. Equipping the vehicle with Aptiv ADS does not affect these considerations.

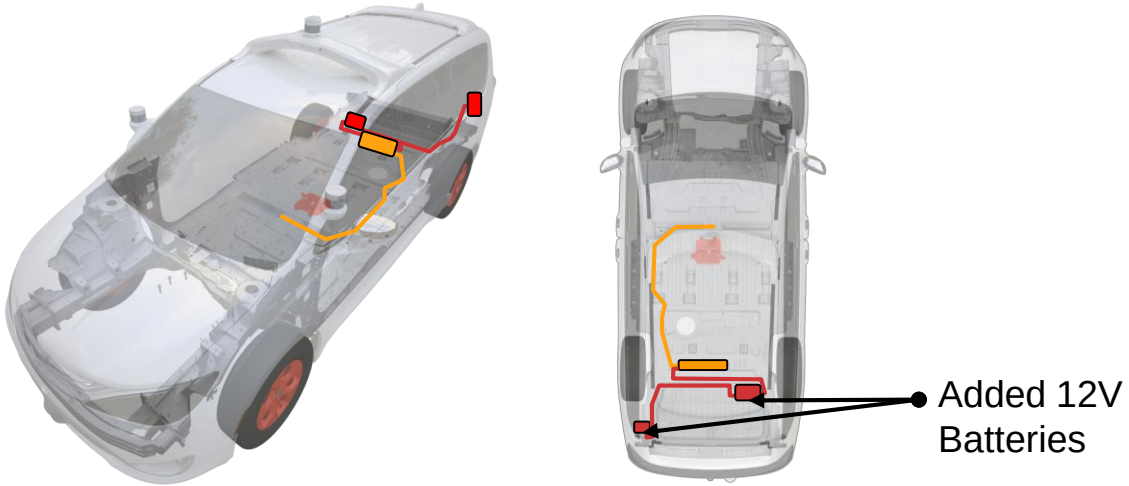
Additional ADS Electrical Systems

ADS vehicles have modified high-voltage and low-voltage wiring in the rear of the vehicle. There are two additional 12V batteries in the trunk.

The modified electrical harness does not alter OEM electrical power disengagement procedures.

Added HV

Added 12V



OEM Electrical Power Disengagement

High Voltage Devices

Stored HV energy in the HV Battery System (1) is provided to the 'PIM' Power Electronics (2) and delivered as three phase AC power to the Electric Motors for propulsion. The stored HV energy is used by other vehicle components including:

- The 'EAC' HV Air Conditioning Compressor (3)
- The 'BCH' Battery Coolant Heater (4) which maintains battery temperature
- The 'APM' auxiliary Power Module (5) that charges the 12 volt low voltage system & battery

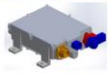
When plugged in, the HV power is supplied by the 'OBCM' On Board Charging Module (6)

(2) PIM

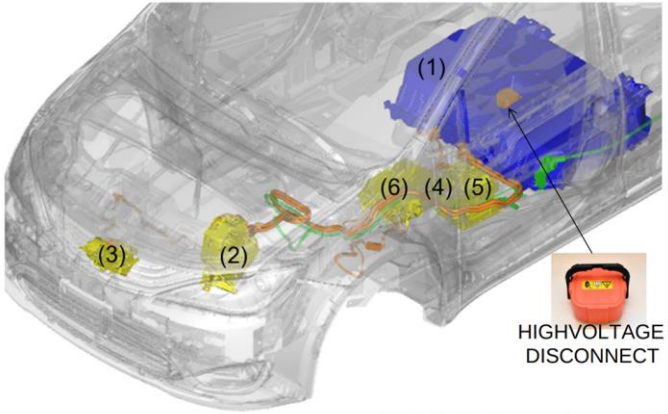
(3) EAC

(4) BCH

(5) APM



(6) OBCM



Emergency Disabling of Low and High Voltage Power

Procedure Step 4: (If possible safely)

Remove the Service Disconnect *This will disable High Voltage output from the battery.*

First: Uncover the Service Disconnect access cover.

Second: Unbolt the cover panel over the Service Disconnect.

Third: Remove the Service Disconnect.

Fourth: Reinstall the cover over the empty socket and replace the carpet.

The Service disconnect cover is between the 1st and 2nd row seat

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ADS Electrical Power Disengagement

The vehicle has an additional 12V battery located in the trunk's driver-side panel, which powers the ADS.

Pull on left panel covering to remove

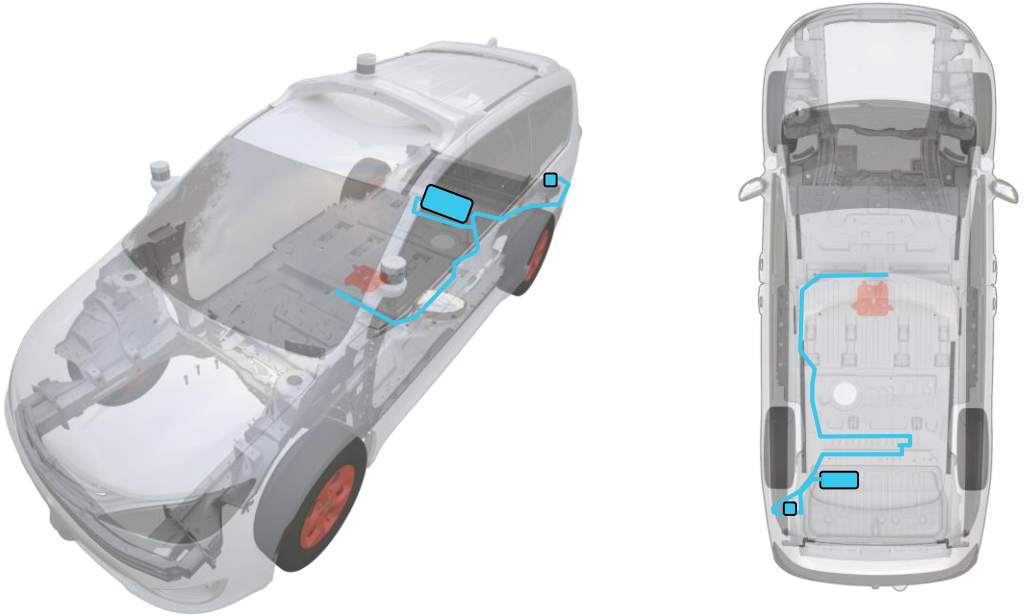
Positive power cable

In an emergency, cut cable to disconnect battery

Liquid Cooling Harness

The vehicle features a liquid cooling harness. The coolant tank is located in the trunk. The coolant is composed of a 1:1 mixture of ethylene glycol and water. **Caution should be exercised to avoid cutting or puncturing coolant lines.**

Added Coolant Lines



Situational Safety Considerations

Wet Location and Firefighting

Wet Location Considerations

A vehicle submerged or flooded with water can result in protective system failures.

Excessive heat and electrolysis may take place resulting in byproducts of hydrogen and oxygen. In salt water chlorine is also a byproduct. These byproducts, trapped and concentrated by the passenger compartment, a garage, or other containment, may be in concentrations that could be explosive or corrosive and could have adverse affects on human health. Action should be taken to assure ventilation of a partially submerged vehicle and any space in which it is contained.

A vehicle **without** impact damage has HV contained to within enclosures or insulation and has HV isolated from the chassis, therefore electrical shock hazard risk is minimal. A submerged or flooded undamaged vehicle has a low electrical shock hazard risk.

A vehicle **with** impact damage presents an increased electrical shock hazard risk. If HV is open to the environment you must stay away from damaged HV components.

Warning: First Responders must use proper Personal Protective Equipment when addressing a damaged Chrysler Pacifica Hybrid vehicle.

Fire Fighting Considerations

Fighting electrified driveline vehicle fires poses unique challenges.

- Never cut, pierce or damage any high voltage component as serious injury may result.
- Chemical extinguishers and oxygen denial are not effective in these fires.
- Deluge with water delivered via fire hose at the maximum possible distance is the recommended practice to contain the fire and cool the reagents, minimizing risk of spread and risk of toxic emissions. This should continue after extinguishment until the pack is cool.
- Application of large amounts of water should begin at the first signs of battery smoke as water may absorb some harmful toxic emissions in the smoke.
- Ventilation of the passenger compartment, if occupied, is essential at the first sign of battery heating, smoke or fire. Batteries should be thermally assessed during initial operations and throughout rescue and remediation efforts.
- Damage, abuse, flooding or exposure to heat (such as from a vehicle fire) can initiate thermal reactions which will advance to a significant fire in lithium ion power systems.
- The Battery thermal reactions become self-sustaining at higher temperatures due to the emission of oxygen from certain constituents.
- Ongoing battery fire or heat production can facilitate the re-ignition of combustible automotive components above and adjacent to the pack.
- Lithium-ion automotive batteries can reignite due to ongoing reactions from internal heat.
- For any battery thermal event, NFPA recommends SCBA be required within fifty feet.

Rescue of persons at risk and containment of the fire with prevention of toxic gas emissions should be the goals of fire-fighting efforts.

Excerpt from FCA guide. Equipping the vehicle with Aptiv ADS does not affect these considerations.

Extrication and Passive Restraint Devices

Extrication Considerations

Impact event emergencies can require the extrication of victims from damaged vehicles. Determination of the need to extricate and timing must be made by incident command based on standard response practices and procedures.

When victims can be removed safely from an electrified driveline vehicle, **it may be prudent** as consequences of damage to high voltage components may evolve over time.

Potential related hazards to vehicle occupants, beyond medical condition and typical automotive impact event hazards will include:

- Fire, which is sustained by heat from a damaged battery or shorted wiring
- Exposure of high voltage potentials from damage to the isolated HV system
- Toxic gaseous emissions from a thermally active damaged battery
- Vehicle stability, or the lack there-of. Lift points indicated on page 21 should be used to immobilize the vehicle when possible before extrication activities.

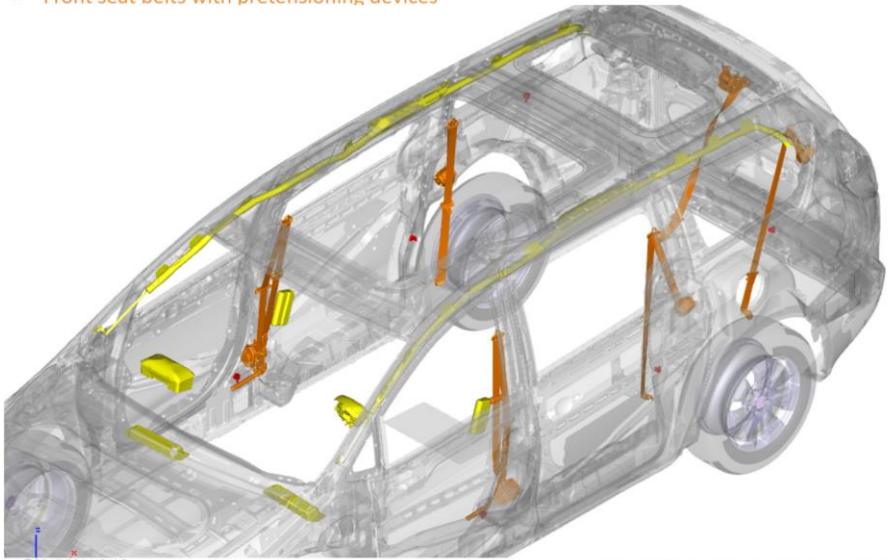
Decisions to extricate must take into account the balance between medical condition and hazard from the state of the vehicle.

Damage to fuel systems, potential hot coolant lines, all high voltage electrical components and cables, the batteries, and potentially active restraint systems must be avoided at all times. See the following pages for location information. (The "Do not cut" illustrations)

Passive Restraint Device Considerations

Restraint Systems:

- Front seat belts with pretensioning devices



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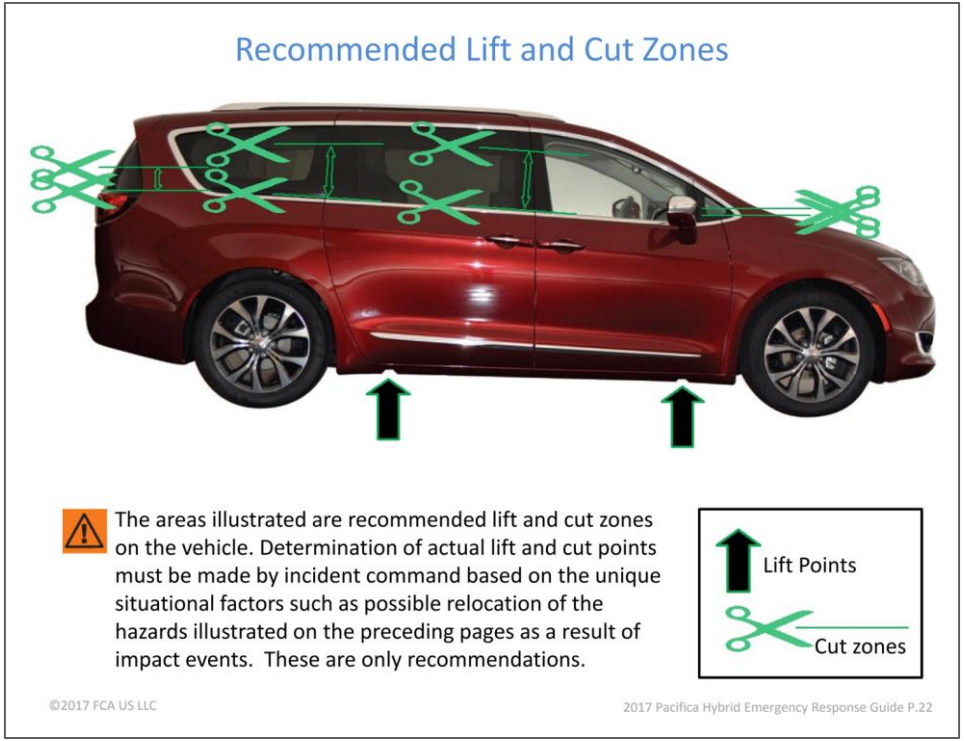
Recommended Lift and Cut Zones



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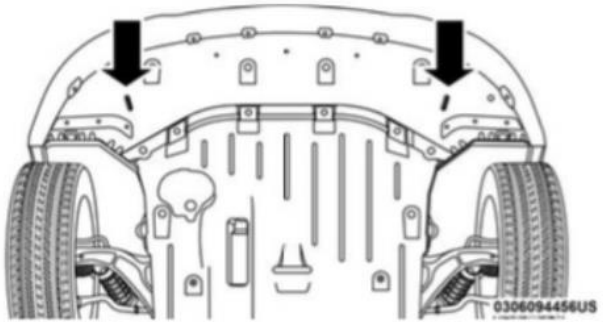
Towing Procedure

An Aptiv employee will contact our preferred towing company on site.

When possible, tow the car with all four wheels off the road using a flatbed.

Prior to towing, ensure that the parking brake is off. See page 10 for details.



Front Recovery Points

If a flatbed is not available, the vehicle should be towed with the front wheels off the ground.

In all cases, please exercise precaution to avoid damaging external sensors.

Post-Incident Handling

Post-incident Handling

Following initial response, certain actions and precautions are necessary. If air bags have deployed, the vehicle cannot be driven again until repaired, as air bag protection will not be available to occupants in the event of a collision. After any collision, the vehicle should be taken to an authorized dealer immediately.

While the Pacifica HV battery is designed for safety, industry-wide experience has demonstrated that the unlikely possibility of delayed ignition or re-ignition of a damaged battery must be considered in post-incident handling. Any battery exposed to accident forces sufficient to deploy air bags or to a vehicle fire requires special precautions until verified as undamaged.

- The vehicle or battery pack must not be stored inside an occupied structure.
- Adequate ventilation must be present at the storage location to prevent buildup of any outgassing.
- Batteries to be recycled must be shipped in accordance with regulations governing the transport of damaged lithium-ion batteries (and never by air).
- Thermal monitoring of any damaged, flooded or burned battery should be performed during storage.
- The manual battery Service Disconnect must not be reinstalled by other than an authorized technician.
- The Service Disconnect socket must be covered/sealed to prevent water or debris entering the battery.

The battery pack in this vehicle uses non-spillable lithium-ion cells, and it is unlikely that electrolyte, which is clear, will escape from the pack in the event of damage. Liquid emissions from damaged packs are typically colored battery coolant, which should be addressed in the same manner as spilled engine coolant.

Do not apply chemical neutralizers used for other battery types or take any other action which could result in battery cell contents being aerosolized.

Do not ingest, inhale, or make bare skin contact with any internal material from the battery cells. In the event of accidental contact of this nature, wash exposed skin thoroughly with soap and water for at least 5 minutes and seek medical attention. In the event of ingestion, seek emergency medical care immediately.

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