



Chevrolet Spark Electric Vehicle

First Responder Guide

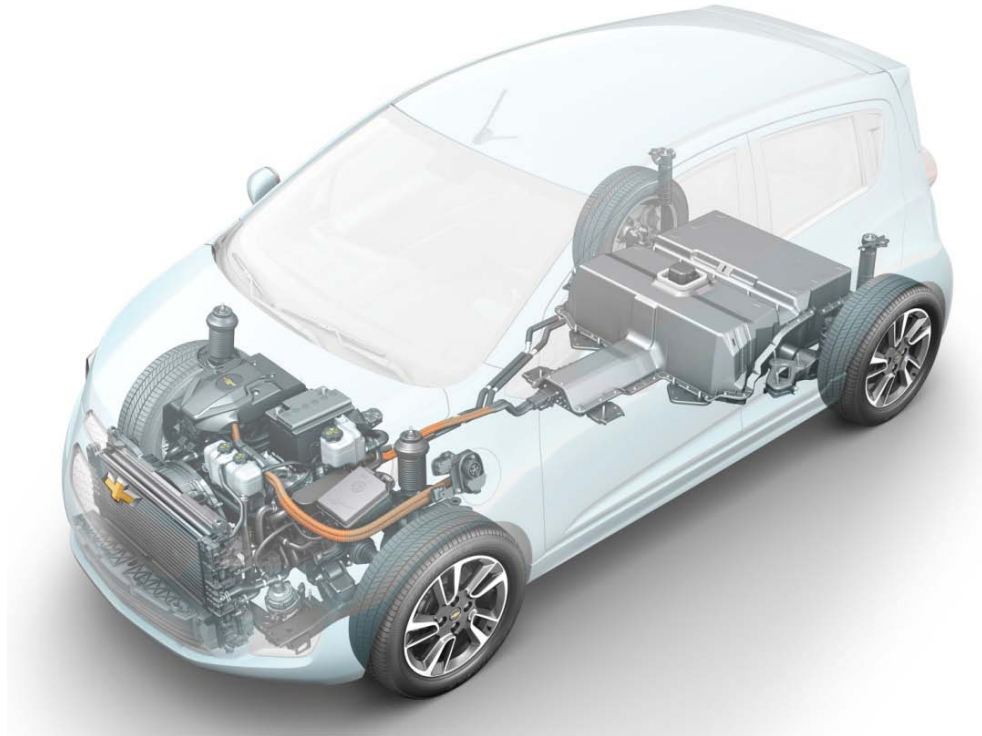


GM Service Technical College provides First Responder Guides (FRG) and Quick Reference (QR) Sheets *free of charge* to First Responders. FRGs and QRs can be displayed in a classroom as long as they are represented as GM information and are not modified in any way.

GM's First Responder Guides are available at www.gmstc.com



The intent of this guide is to provide information to help you respond to emergency situations involving Chevrolet Spark Electric Vehicle (EV) in the safest manner possible. This guide contains a general description of how the Chevrolet Spark EV systems operate, identifies the location of the unique badging, and includes illustrations of the unique components. The guide also describes methods of disabling the high voltage system and identifies cut zone information.



The Chevrolet Spark EV is a fully electric, front-wheel drive, four-passenger vehicle. The Spark EV uses electrical energy that is stored in a high voltage battery to drive a single electric motor. Once the battery capacity is reduced, the vehicle must be recharged by an external energy source.



Vehicle Identification

The Spark EV badging is one method of identifying the vehicle. The badging will include the acronym "EV" which denotes Electric Vehicle. The vehicle's logo is located on the right side of the deck lid as well as low on the rear bumper. You may also identify the vehicle by the charge port on the left fender.





Vehicle Identification (continued)

A unique Liquid Crystal Display (LCD) instrument panel cluster assists in identifying the Chevrolet Spark EV.

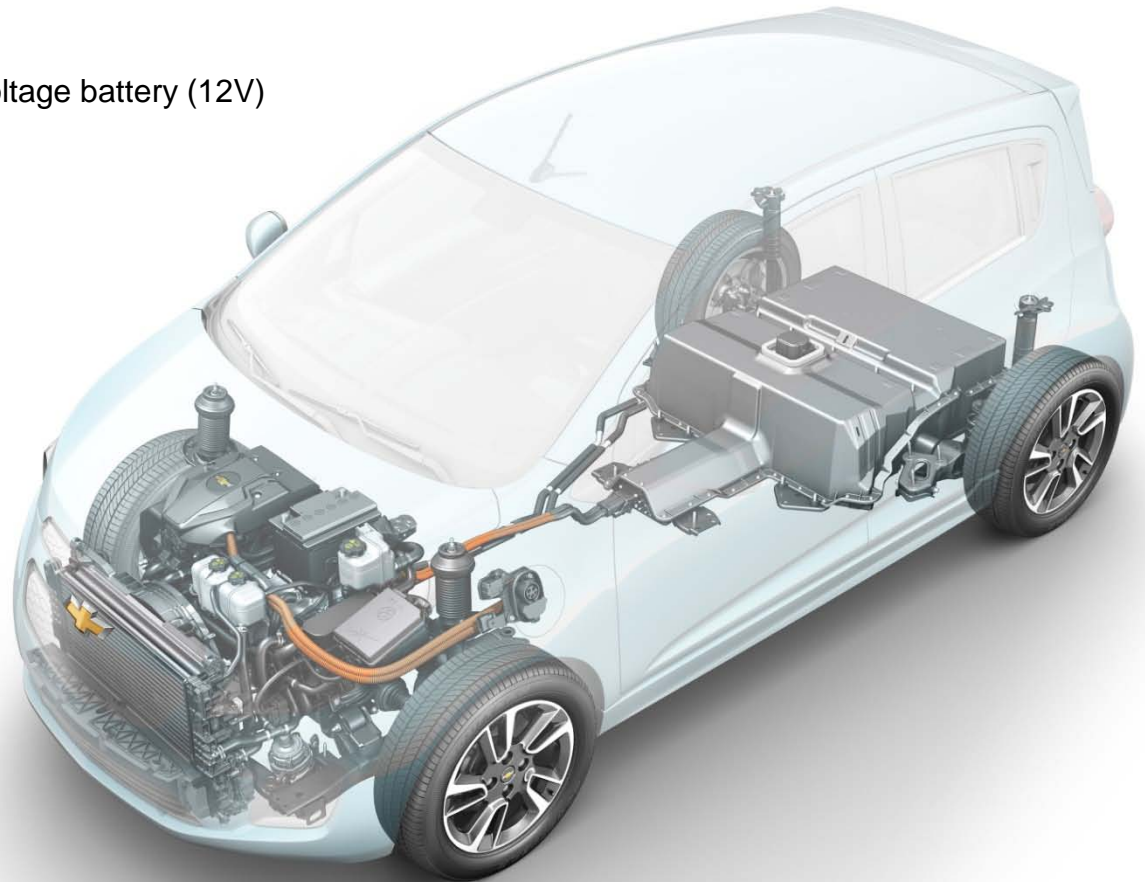




System Components

The Spark EV propulsion system is composed of the following components and systems:

- High voltage battery
- Absorbent Glass Mat (AGM) low voltage battery (12V)
- Power inverter module
- Accessory power module
- High voltage battery charger
- High voltage battery DC charger
- 1ET35 Transmission

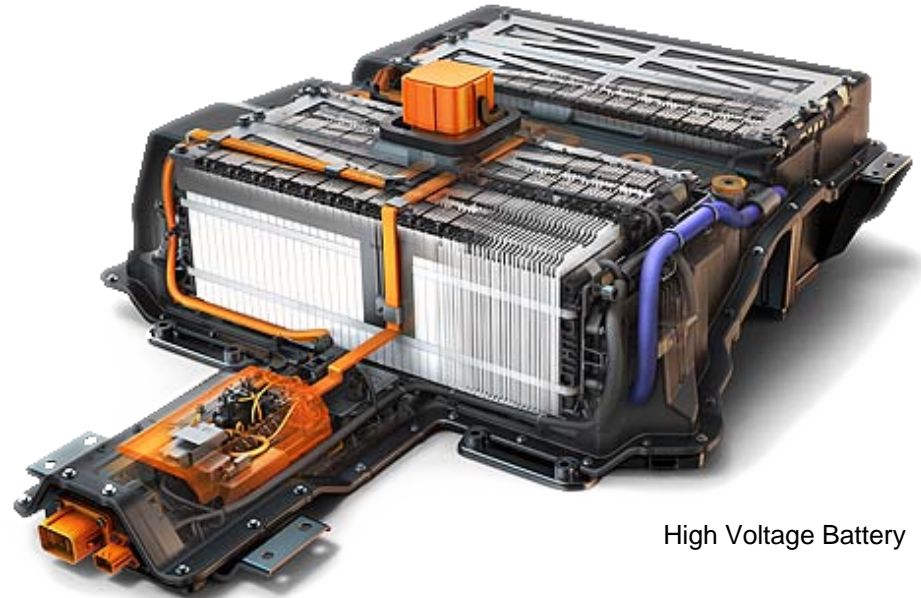




High and Low Voltage Batteries

Drive Motor Battery

The high voltage battery, also known as the drive motor battery, is a system of many components that operate together to provide the energy required for vehicle propulsion. The energy storage cells are comprised of a lithium-phosphate compound and has a nominal voltage level of 360 volts. High voltage contactors, internal to the battery pack, turn on and off to control the output of stored electrical energy.



High Voltage Battery

Low Voltage Battery (12 Volt)

The Chevrolet Spark EV's low voltage system (12V) utilizes an Absorbent Glass Mat (AGM) lead acid battery. The battery is located under the hood towards the left side. The low voltage energy is utilized by vehicle modules to control the high voltage battery contactors. Severing the low voltage cables should cause the high voltage contactors to open. The low voltage (12V) cable cut location is found in the engine compartment rearward of the right strut tower.



Low Voltage AGM Battery



Drive Motor / Generator Power Inverter Module

The power inverter module is located under the hood on the right side and is mounted on top of the transmission. The module changes the high voltage Direct Current (DC) into 3 phase alternating current. This 3-phase electrical energy provides vehicle propulsion to the motor within the transmission.

Accessory DC Power Control Module

The accessory DC power module is mounted underneath the power inverter module. The module replaces the typical generator common to conventional vehicles. Its function is to convert high voltage DC electrical energy into low voltage DC electrical energy to provide the energy needed for the vehicle systems.

Power Inverter Module

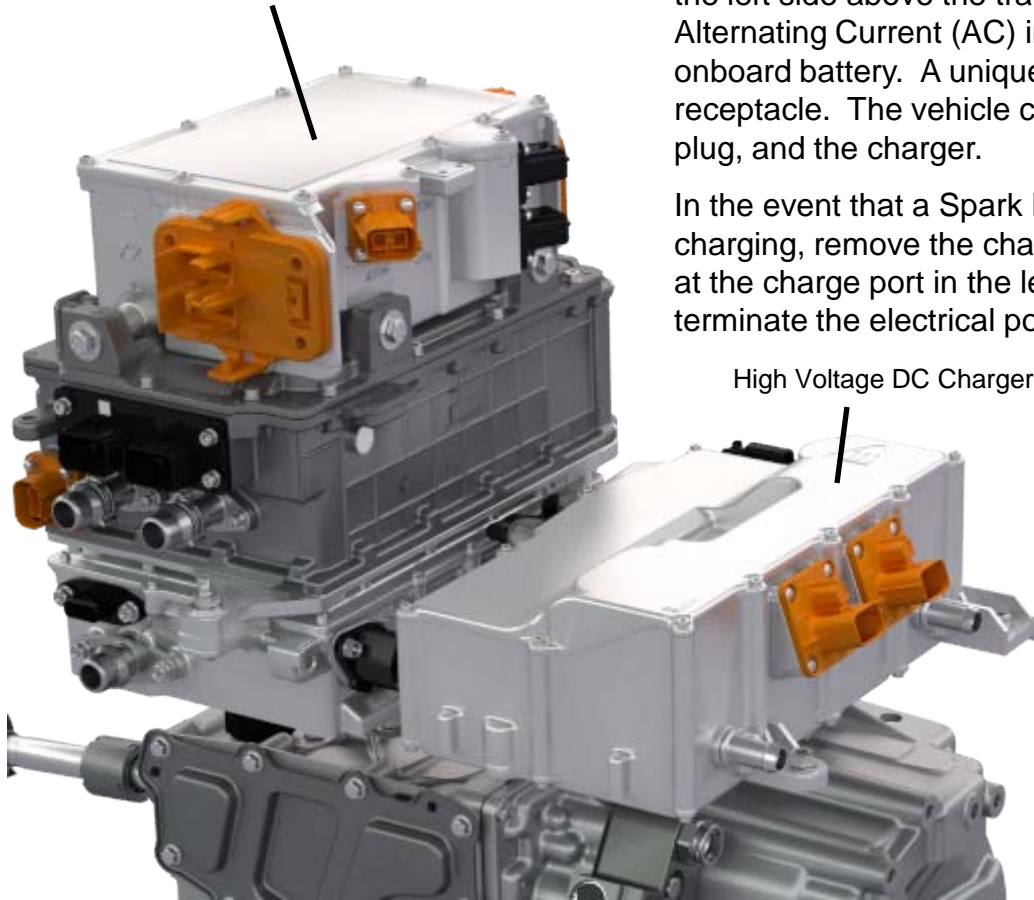


Accessory DC Power Control Module



High Voltage Charger

High Voltage DC Charger



The Chevrolet Spark EV features an onboard high voltage charger that recharges the high voltage battery. The charger is located under the hood on the left side above the transmission. The charger converts household Alternating Current (AC) into Direct Current (DC) voltage to charge the onboard battery. A unique cord connects the vehicle to an electrical receptacle. The vehicle charge port provides the interface between the cord, plug, and the charger.

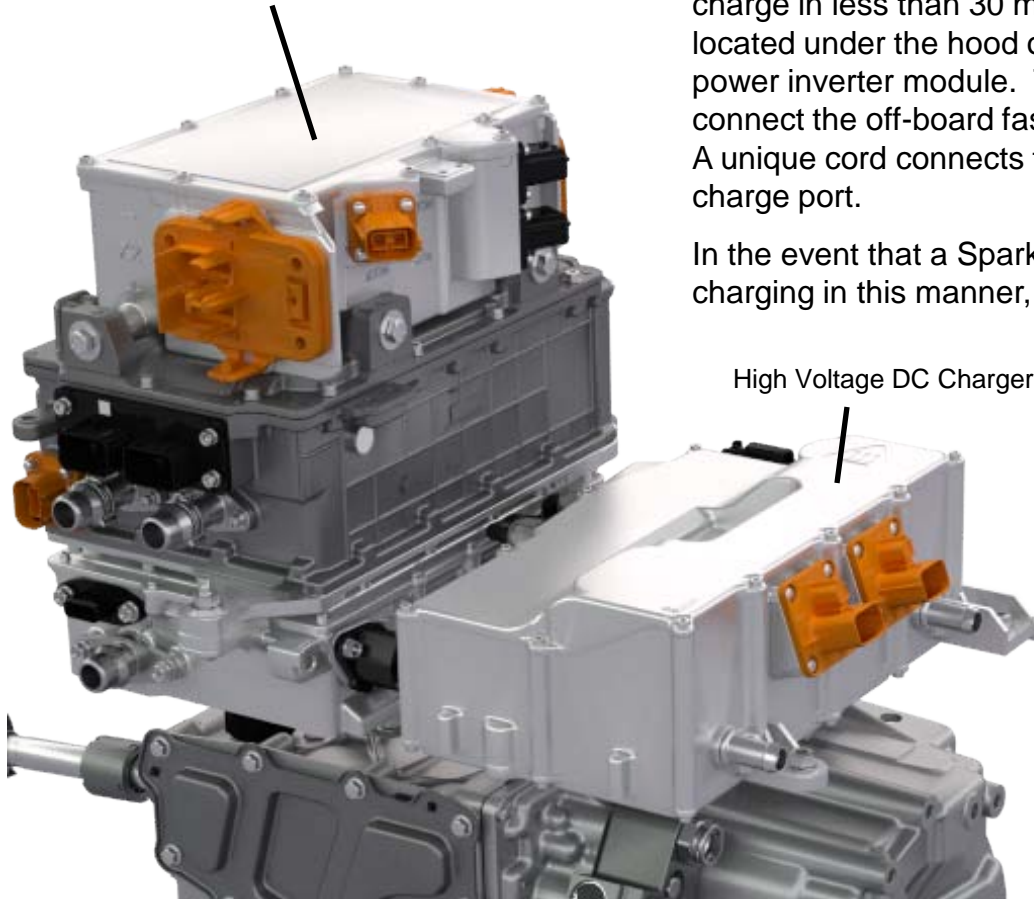
In the event that a Spark EV is involved in an incident while the battery is charging, remove the charge cord from the car using the charger cord handle at the charge port in the left front fender. If that cannot be accomplished, terminate the electrical power at the source.

High Voltage DC Charger



High Voltage DC Fast Charger

High Voltage DC Charger



The Chevrolet Spark EV features an optional DC fast charge capability. Utilizing a commercial off board charger, the Spark EV can achieve an 80% charge in less than 30 minutes. The drive motor battery DC charger is located under the hood on the right side above the drive motor / generator power inverter module. The DC charger utilizes a set of contactors to connect the off-board fast charge station directly to the drive motor battery. A unique cord connects the vehicle to a DC fast charge station through the charge port.

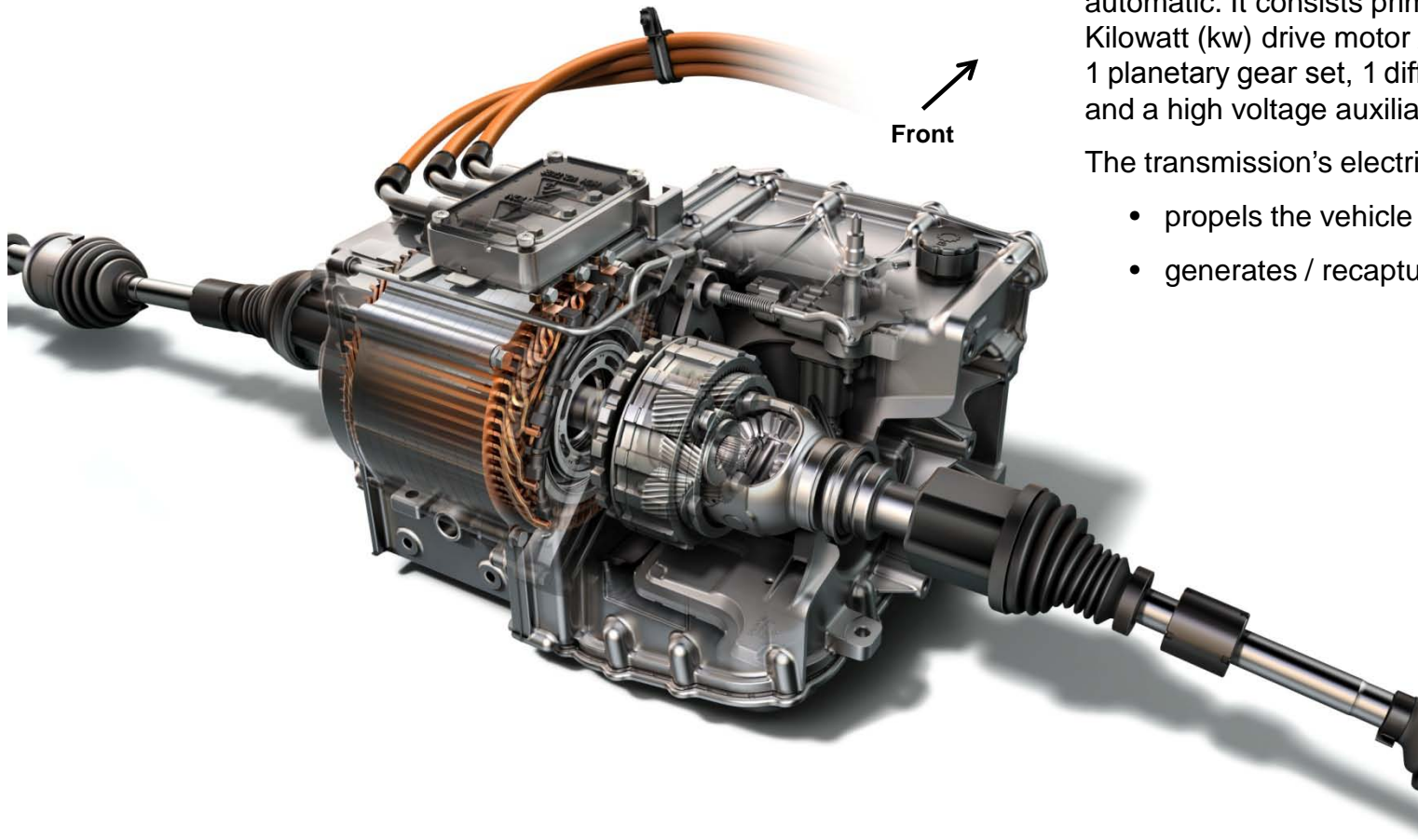
In the event that a Spark EV is involved in an incident while the battery is charging in this manner, terminate the electrical power to the charge station.

High Voltage DC Charger

Vehicles that are not equipped with this option will still feature the DC charger assembly as it is a electrical junction for high voltage components.



1ET35 Transmission



The variable-speed, electronically controlled, front wheel drive transmission is fully automatic. It consists primarily of 2 axles, 85 Kilowatt (kw) drive motor / generator, 1 planetary gear set, 1 differential gear set, and a high voltage auxiliary fluid pump.

The transmission's electric motor / generator:

- propels the vehicle
- generates / recaptures energy



The Spark EV is an all Electric Vehicle (EV). Stored electrical energy is used to power a single 85Kw motor. The vehicle operates until the battery has reached a low state of charge. Once the stored electrical energy is depleted, the vehicle must be charged using an external power source.

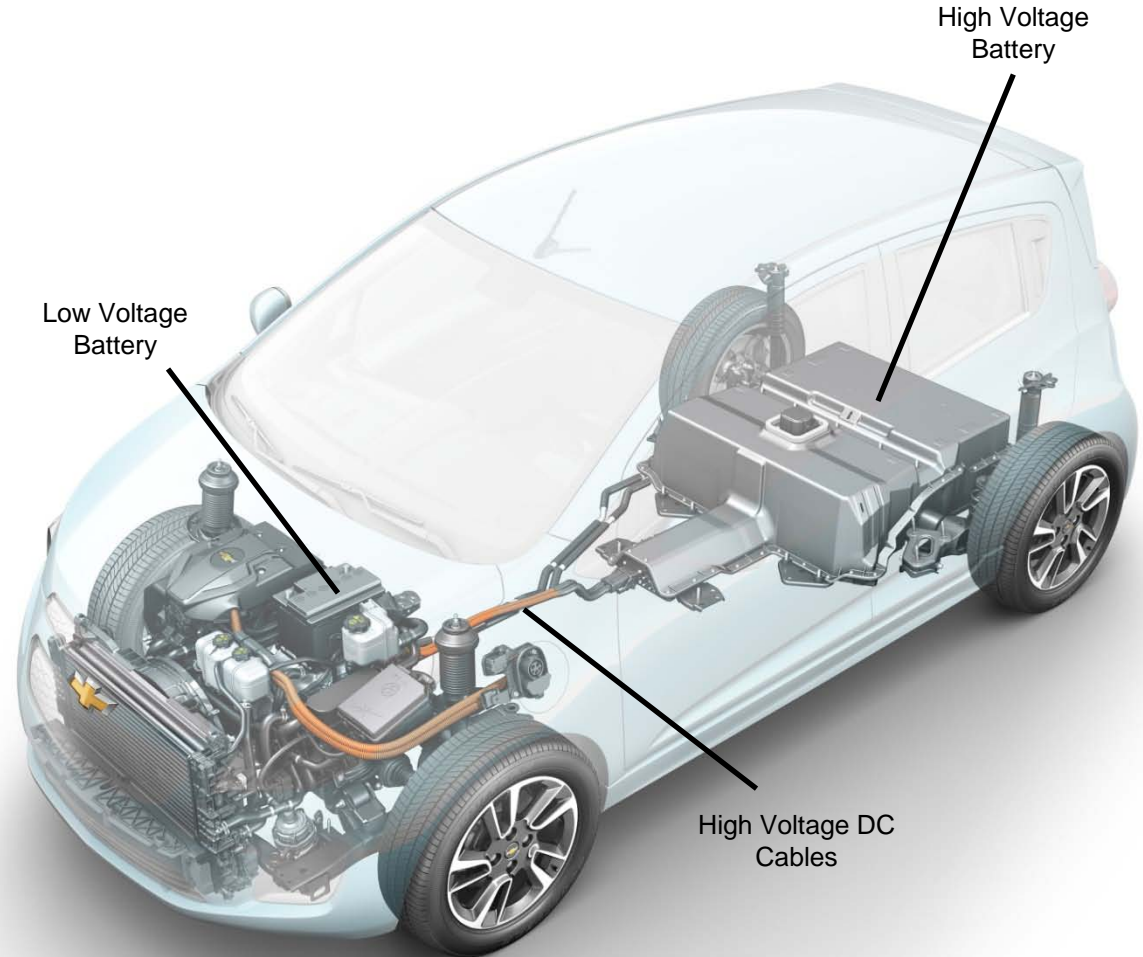




System Operation (continued)

There are two separate electrical systems in the vehicle: low voltage and high voltage. The low voltage system is similar to a conventional systems. The high voltage electrical system distributes 360 volts DC between the high voltage components and 3-phase AC to the transmission.

The high voltage cables are orange in color to easily identify the potential existence of high voltage. High voltage cables that are routed through non-orange conduit are identified with high voltage warning labels.





Voltage Classifications

The two voltage levels in the Spark EV are:

- **Low voltage** – from 0 to 30 volts DC or 0 to 15 volts AC
- **High voltage** – any voltage greater than 60 volts DC or 30 volts AC

Classification	Low Voltage	High Voltage
Voltage Ranges	DC \leq 30v AC \leq 15v	DC > 60v AC > 30v RMS

Color coding identifies the different levels. Orange identifies high voltage cables.



DC Voltage Classifications

Chevrolet Spark EV's use high voltage, specifically 360 volts DC. Therefore, one **MUST** approach an emergency situation with caution. Keep in mind that the vehicle should isolate and contain the high voltage within the drive motor battery. However, a disable procedure must be performed before proceeding with any repair facility service work.



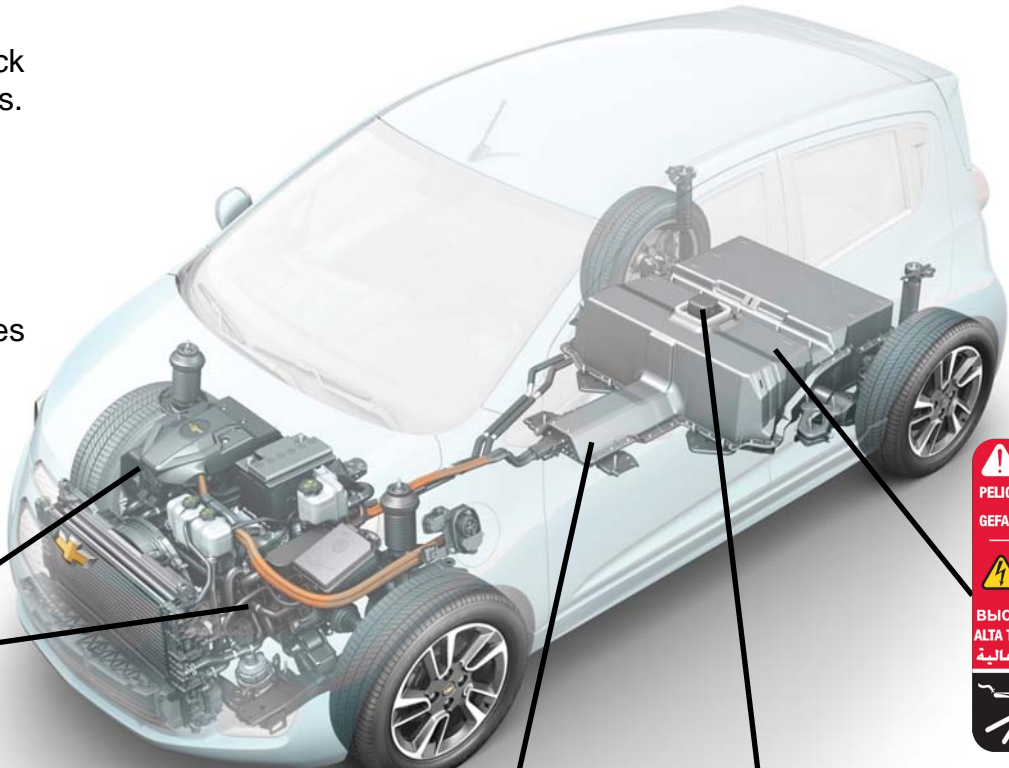


High Voltage Labels

A series of high voltage labels enable quick identification of potential electrical hazards. The labels are attached onto each high voltage component.

The labels are color coded to indicate the potential high voltage state.

There is also a pictorial label that illustrates the removal of the high voltage Manual Service Disconnect (MSD).



	HIGH VOLTAGE	ALTA TENSÃO
	HAUTE TENSION	HOCHSPANNUNG
	高压	فلطية عالية
	ALTO VOLTAJE	고압
	ВЫСОКОЕ НАПРЯЖЕНИЕ	高電圧
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	DANGER 危險
	PELIGRO ОПАСНО PERIGO
	GEFAHR خطر 위험 危險
	HIGH VOLTAGE
	HAUTE TENSION
	高压 ALTO VOLTAJE
	ВЫСОКОЕ НАПРЯЖЕНИЕ
	ALTA TENSÃO HOCHSPANNUNG
	فلطية عالية 고압 高電圧
20814334	

	⚠ DANGER ⚠ HIGH VOLTAGE 400V	⚠ DANGER ⚠ HAUTE TENSION 400V
	ENERGY STORAGE DEVICE To help avoid burns or electric shock: • Service by qualified personnel only. • Remove manual service disconnect before service.	SYSTÈME DE STOCKAGE D'ÉNERGIE Pour éviter les brûlures ou les chocs électriques : • Seul le personnel qualifié est autorisé à effectuer l'entretien. • Déposer le sectionneur de service manuel avant de procéder à la réparation.
	⚠ 危險 ⚠ 高压 400V	⚠ PELIGRO ⚠ ALTO VOLTAJE 400V
	DISPOSITIVO DE ALMACENAMIENTO DE ENERGÍA Para ayudar a evitar quemaduras o choque eléctrico: • El servicio sólo lo debe realizar personal calificado. • Retire la desconexión manual de servicio antes de dar servicio.	에너지 저장 장치 화상 또는 전기 쇼크 방지에 도움이 되려면: • 자격있는 직원이 정비해야 합니다. • 정비 전에 수동식 정비 분리 장치를 제거합니다.
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	1	2
	3	4



High Voltage Labels

The emergency / service personnel warning label is affixed to the right side of the power inverter module and provides specific disable procedures for emergency personnel.

EMERGENCY PERSONNEL :
To help avoid personal injury in an emergency,
 • Turn off the ignition switch,
 • Cut the wire harness cable located in the front right Wheel House at the yellow tape.


PERSONNEL AFFECTE AUX URGENCES :
Afin d'éviter toute lésion personnelle, effectuer ce qui Suit en cas d'urgence :
 • Fermer le cle de contact,
 • Couper le wire harness qui est dans le Wheel House at the yellow tape.

긴급 대책 요령:
 긴급 상황 시 부상을 당하지 않도록
 • 점화장치 스위치를 끈다,
 • 전방 오른쪽 휠 하우스에 있는 하네스를 노란색 테이프에서 절단 한다.

SERVICE PERSONNEL:
To help avoid personal injury during vehicle service, disconnect both battery locations (see diagram).

PERSONNEL AFFECTÉ À L'ENTRETIEN :
Afin d'éviter toute lésion personnelle pendant l'entretien du véhicule, déconnecter les deux emplacements de la batterie (voir diagramme).

서비스 담당:
차량서비스 중 부상을 당하지 않도록 배터리 양쪽 단자에서 케이블을 분리한다.(그림참조)



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⚠ DANGER 危険
PELIGRO ОПАСНО PERIGO
GEFAHR خطر 위험 危険

⚡ HIGH VOLTAGE
HAUTE TENSION
高压 ALTO VOLTAJE
ВЫСОКОЕ НАПРЯЖЕНИЕ
ALTA TENSÃO HOCHSPANNUNG
فعلطبة عالية 고압 高電圧

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⚠ DANGER ⚡ HIGH VOLTAGE 400V | **⚠ DANGER ⚡ HAUTE TENSION 400V**

ENERGY STORAGE DEVICE
To help avoid burns or electric shock:
 • Service by qualified personnel only.
 • Remove manual service disconnect before service.

SYSTÈME DE STOCKAGE D'ÉNERGIE
Pour éviter les brûlures ou les chocs électriques :
 • Seul le personnel qualifié est autorisé à effectuer l'entretien.
 • Déposer le sectionneur de service manuel avant de procéder à la réparation.

⚠ 危険 ⚡ 高压 400V | **⚠ PELIGRO ⚡ ALTO VOLTAJE 400V** | **⚠ 위험 ⚡ 높은 전압 400V**

蓄电设备
为避免发生灼伤或电击事故:
 • 仅可由合格技师操作
 • 维修前请拆除手动维修断开连接。

DISPOSITIVO DE ALMACENAMIENTO DE ENERGÍA
Para ayudar a evitar quemaduras o choque eléctrico:
 • El servicio sólo lo debe realizar personal calificado,
 • Retire la desconexión manual de servicio antes de dar servicio.

에너지 저장 장치
화상 또는 전기 쇼크 방지에
도움이 되려면:
 • 자격있는 직원이 정비해야
합니다.
 • 정비 전에 수동식 정비 분리
장치를 제거합니다.

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The high voltage danger labels are red and indicate that high voltage is present at all times. These labels are located only on the high voltage battery.

⚠ HIGH VOLTAGE | **ALTA TENSÃO**
HAUTE TENSION | **HOCHSPANNUNG**
高压 | **فعلطبة عالية**

⚡ ALTO VOLTAJE | **고압**
ВЫСОКОЕ НАПРЯЖЕНИЕ | **高電圧**

⚡ | **⚡** | **🔧**

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The high voltage warning labels are orange and indicate a potential shock hazard if high voltage is not properly disabled. The labels are located on all high voltage components with the exception of the high voltage battery which utilizes the danger label.



First Responder Label & Tag

The First Responder cable cut tag is wrapped around the low voltage power wires for the air bag module and the EV control module. It is located in the front right wheel house behind the right strut tower. Always cut the low voltage cables to ensure the high voltage contactors are open before performing any extrication work.



EMERGENCY PERSONNEL :
To help avoid personal injury in an emergency,


- Turn off the ignition switch,
- Cut the wire harness cable located in the front right Wheel House at the yellow tape.

PERSONNEL AFFECTE AUX URGENCES :
Afin d'éviter toute lésion personnelle, effectuer ce qui suit en cas d'urgence :

- Fermer le clé de contact,
- Couper le wire harness qui est dans le Wheel House at the yellow tape.

긴급 대처 요령 :

- 긴급 상황 시 부상을 당하지 않도록 정화장치 스위치를 끄는다.
- 전방 오른쪽 휠 하우스에 있는 하네스를 노란색 테이프에서 절단 한다.

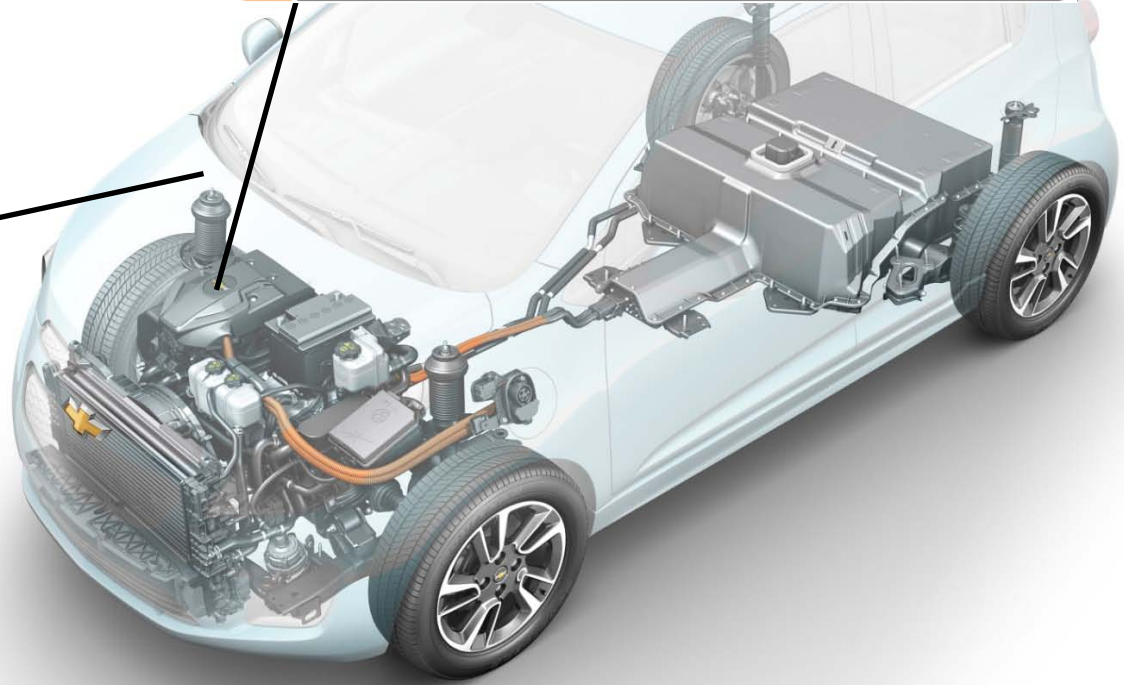


SERVICE PERSONNEL:
To help avoid personal injury during vehicle service, disconnect both battery locations (see diagram).

PERSONNEL AFFECTÉ À L'ENTRETIEN :
Afin d'éviter toute lésion personnelle pendant l'entretien du véhicule, déconnecter les deux emplacements de la batterie (voir diagramme).

서비스 담당 :
차량서비스 중 부상을 당하지 않도록 배터리 양쪽 단자에서 케이블을 분리한다.(그림참조)

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First Responder Cut Tag

First responder cut tags help First Responders safely disable the vehicle in an emergency situation. The cable cut tag is yellow and wraps around the low voltage positive cable to indicate where emergency personnel must cut the cable.



Important: Cut through the cables on each side of the tag to remove a section of the cable to ensure they cannot reconnect inadvertently.



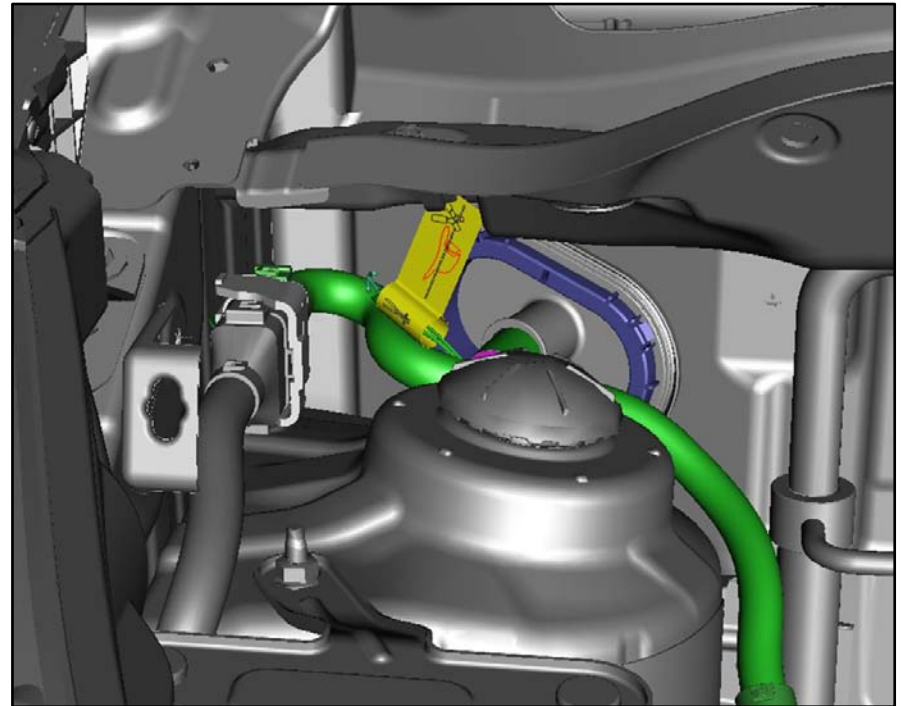
Disabling The Vehicle

To disable the vehicle:

1. Turn OFF the ignition switch by pressing the button on the center console controls.
2. Cut the wire harness cable located in the front right wheel house, behind the strut tower at the yellow tape.

Note: After disabling 12 volt power, wait 1 minute to allow any un-deployed air bag reserve energy to dissipate.

Important: Cut through the harness on each side of the tag to remove a section of the cable. This ensures that they cannot reconnect inadvertently.

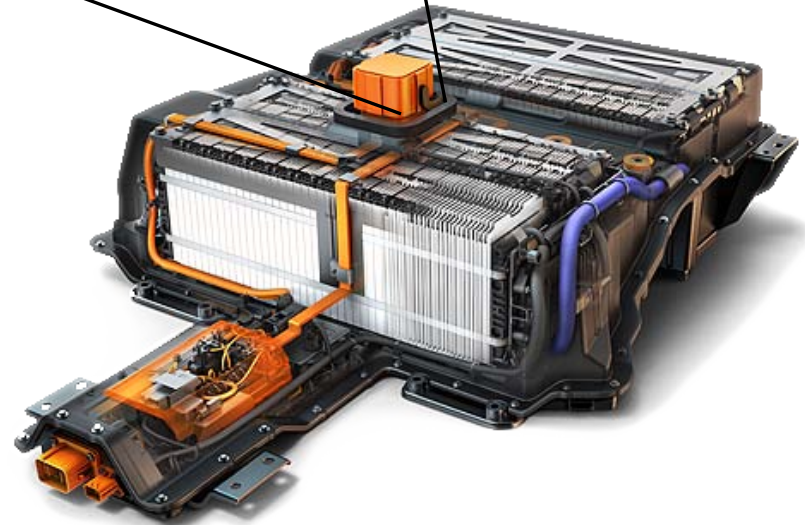
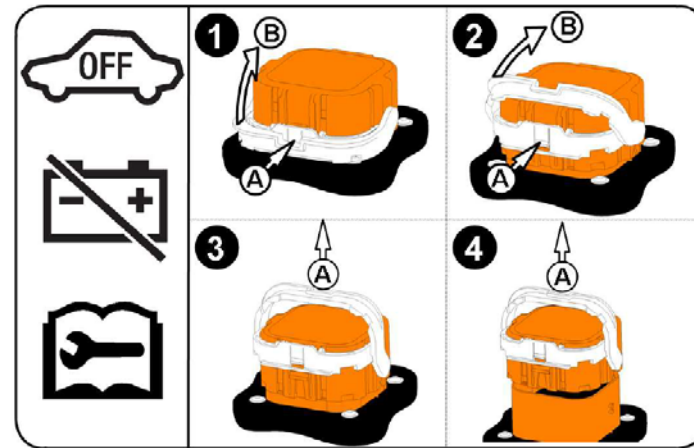




Disabling the High Voltage Battery

The Manual Service Disconnect (MSD) may also be removed to further ensure the high voltage system is disabled within the battery. The MSD physically interrupts the high voltage cables internal to the battery. A label illustrating the removal of the MSD is located underneath the rear seat cushion.

Note: There is high voltage in the battery even after the MSD is removed.

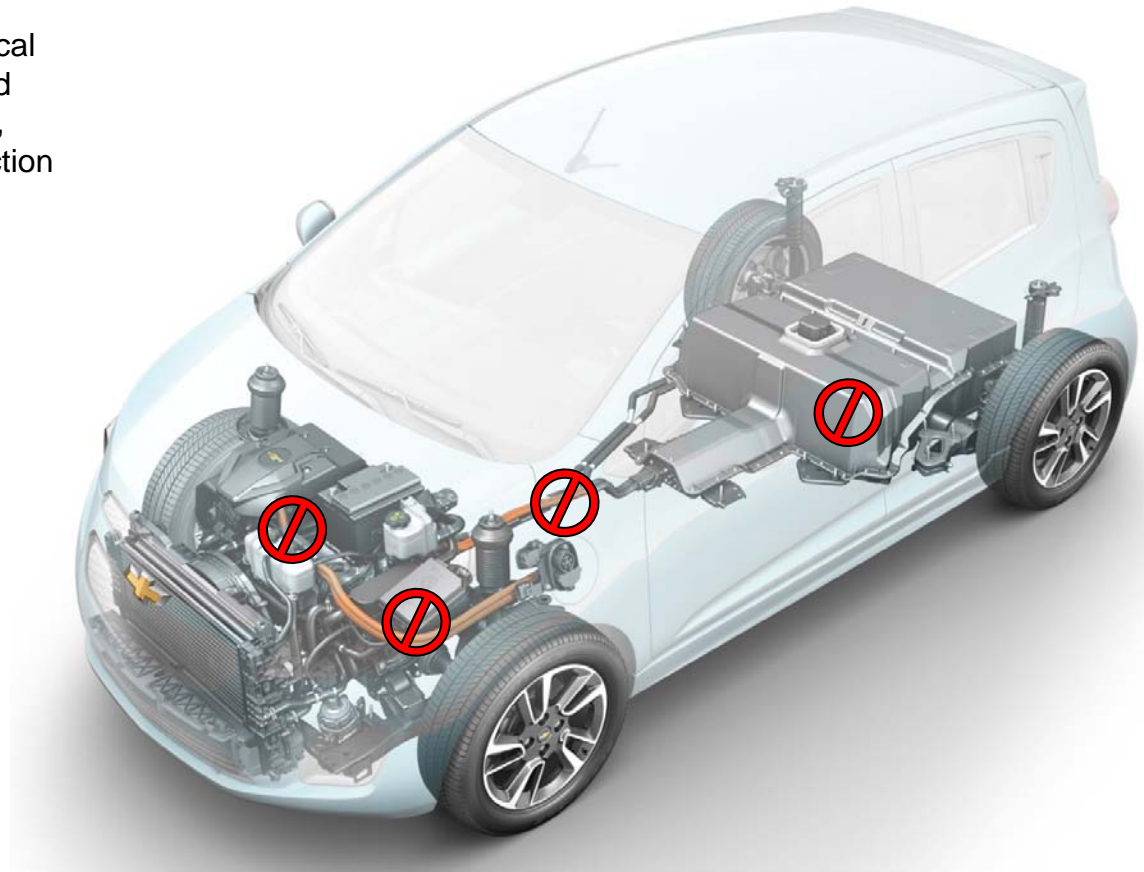




Cable - DO NOT CUT ZONES

The high voltage cables in the Chevrolet Spark EV are highly protected and should not interfere with any extraction procedures. However, always perform the disabling procedure prior to work to eliminate electrical current flow through the 12 volt system and disables the high voltage electrical system, external to the 360V battery. No further action is required.

DANGER: Do NOT cut the orange high voltage 360V cables. Cutting these cables can result in serious injury or death. No matter which disable method you perform, always assume the high voltage cables and components contain high voltage.



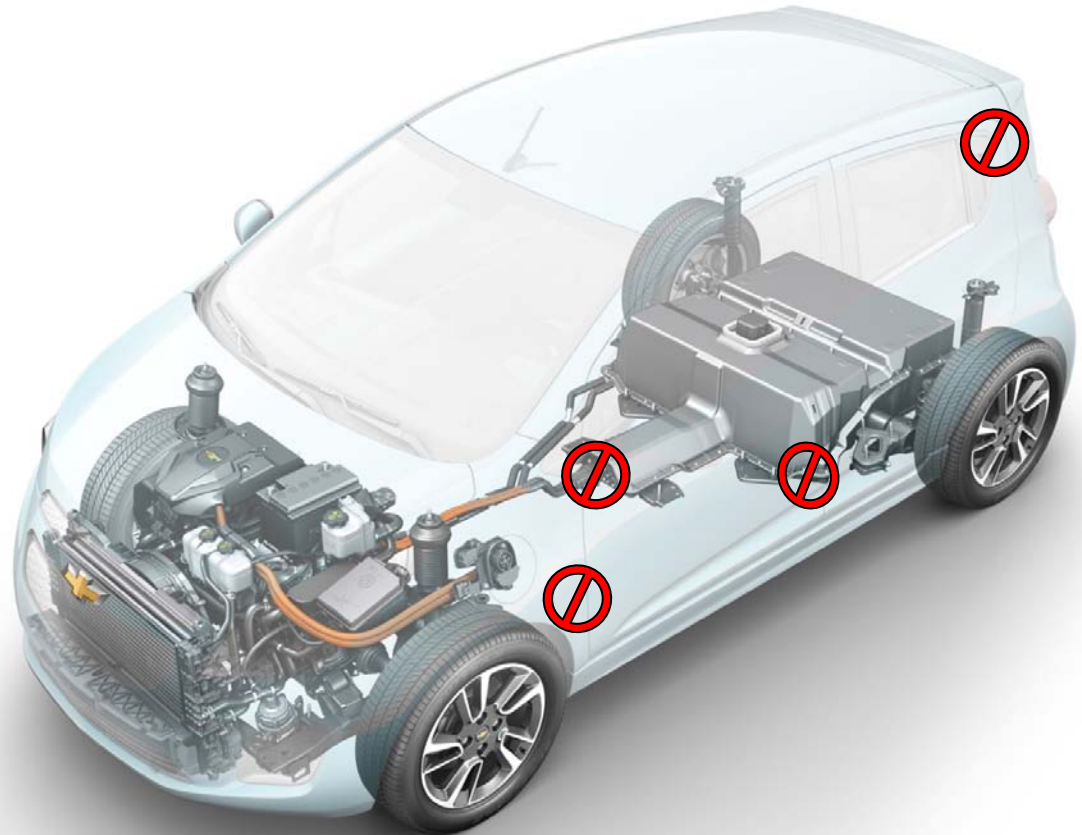


Vehicle - DO NOT CUT ZONES

Do NOT cut the:

- Center tunnel area or the area under the rear seats - the 360V battery is installed in this area.
- Roof rails near the lift gate hinge - side curtain air bag inflators and lift gate hold open struts are located in this area.
- Front and rear seat backs on the outboard side - contains side air bags.
- The B pillar near the rocker - contains the seat belt pretensioner and the side impact sensor.
- The front door area near the upper hinge - additional side impact sensors are located there.

WARNING: Do NOT cut into the vehicle until the 12V electrical system has been disabled. Cutting into the vehicle prior to disconnecting and isolating the 12V electrical energy sources may cause air bag deployment resulting in serious injury.

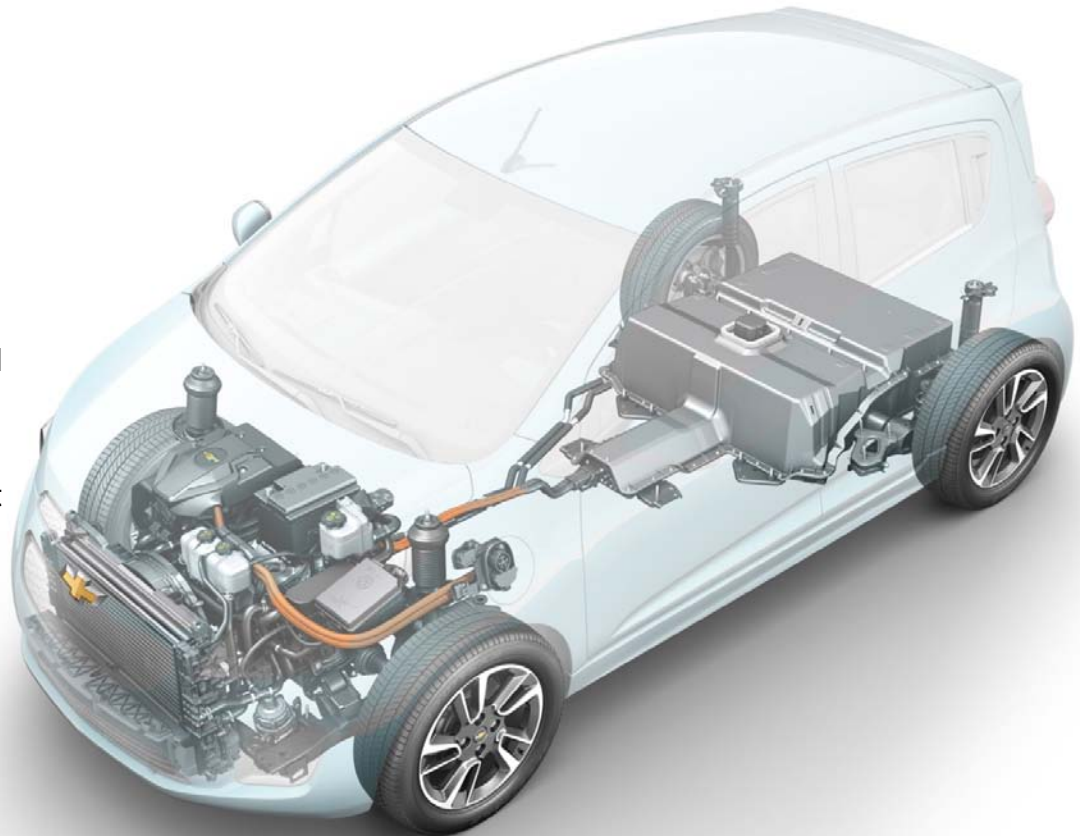




The vehicle has been designed to protect the occupant(s) during a collision. The vehicle design begins with a strong, body-frame-integral structure. High-strength steel makes up more than 62 percent of the Spark EV's underbody and 42 percent of its upper body. Adequate cutting tools will be required to penetrate the structure.

The Spark EV is equipped with 10 standard air bags, including both driver and passenger front knee air bags to reduce the risk of injuries to lower extremities in frontal crashes. Dual-stage frontal air bags, seat-mounted side air bags, and side curtain air bags that extend over the front and rear seating rows are also standard.

Additionally, crumple zones protect the occupant with front, side, and rear rails that are designed to crush in the event of a collision.





Air Bag Deployment

Whenever the air bags deploy, the contactors within the high voltage battery are commanded open. This interrupts the 360 volt electrical system and discontinues current flow through the high voltage cables.

Because the vehicle is equipped with dual-stage front air bags, the appearance of deployed air bags does not ensure that all stages of air bag deployment has occurred.

Therefore, disabling 12 volt power is essential for personal safety even if the air bags in the vehicle appear to have been deployed. After disabling 12 volt power, wait 1 minute to allow any un-deployed air bag reserve energy to dissipate.





First Responder Considerations

Approaching a vehicle that is charging

To stop charging a vehicle, first attempt to unplug the charge cord at the vehicle. If access is unavailable, turn off the power to the charge station or cord set.

Fire

A battery on fire will not explode. If battery cells reach high enough temperature, they vent and release electrolyte. Battery electrolyte is flammable. Use copious amounts of water to cool the battery and extinguish the fire. Do not use an ABC dry chemical extinguisher because it will not extinguish a battery fire.

Water

The high voltage battery is sealed and isolated from the vehicle chassis. If the vehicle is immersed in water, you will not be electrocuted by touching the vehicle.

Locate and review the Lithium-Ion Battery Chemistry Material Safety Data Sheet for more information.





General Motors is committed to making your job as safe as possible.

We are confident the information contained in this guide will prove useful as you prepare to assist those involved in an emergency event.



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