

# Compressed Natural Gas (CNG) & Liquefied Petroleum Gas (LPG) Vehicles

## Emergency Response 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](http://www.gmstc.com)

The intent of this guide is to provide information to help you respond to emergency situations involving GMC Savana and Chevrolet Express Compressed Natural Gas (CNG) and Liquefied Propane Gas (LPG) vehicles in the safest manner possible. In addition, this guide will also cover the Chevrolet Silverado and GMC Sierra Bi-Fuel vehicles that operate on both gasoline and CNG. This guide contains a general description of how the Chevrolet Express and Silverado, the GMC Savana and Chevrolet Sierra CNG, Ray and Bi-Fuel vehicles operate and includes illustrations of their unique components. The guide also identifies potential safety concerns with each system.



# GMC Savana and Chevrolet Express Dedicated LPG Vehicles

LPG fuel systems are found on some GMC Savana and Chevrolet Express Chassis Cab or Cutaway Vans. These vehicles are available with a three- or four-tank LPG system. Examples of these vehicles are shown below.



# Vehicle Identification

The LPG symbol pictured below can be found on the rear of an LPG vehicle.



# System Operation

The GMC Savana and Chevrolet Express LPG Chassis Cab vans are equipped with a Vortec 6.0L V8 engine, designed especially for LPG operation.

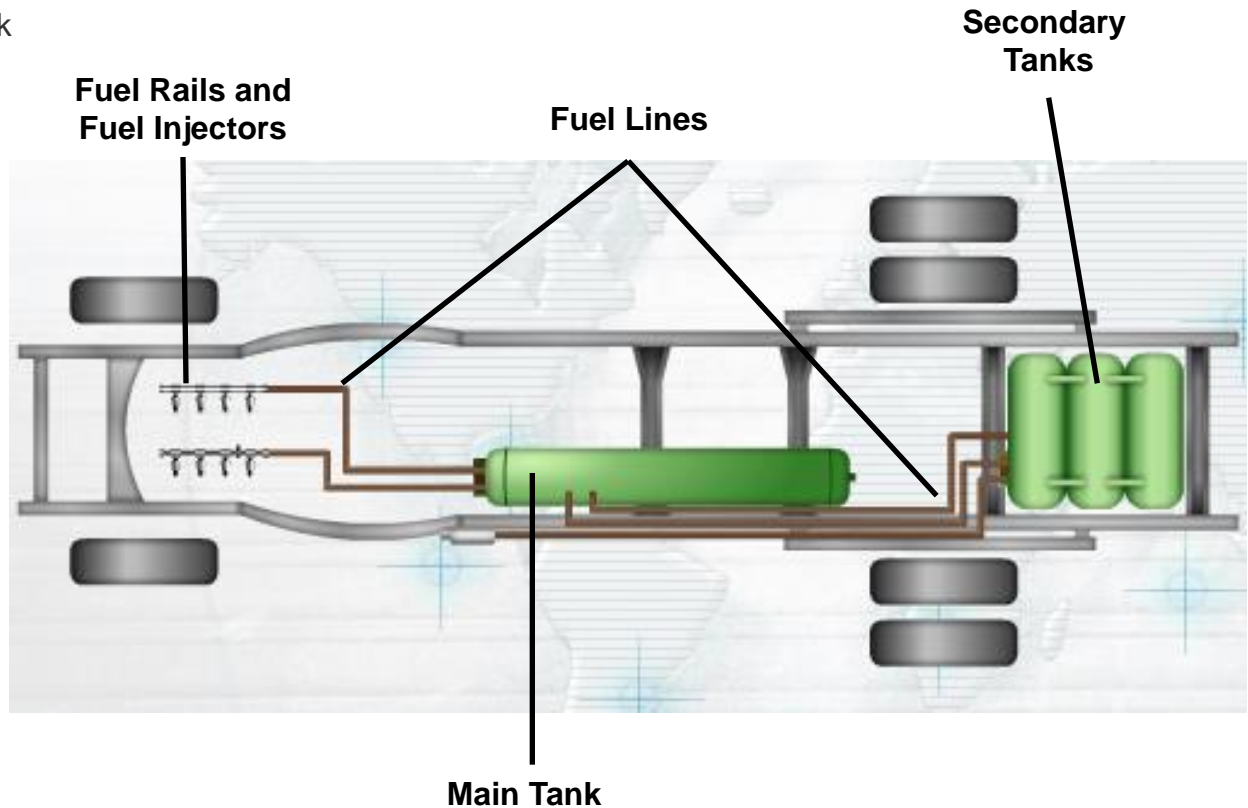


# Four-Tank LPG System Components

There are three-tank and four-tank versions of the LPG fuel system.

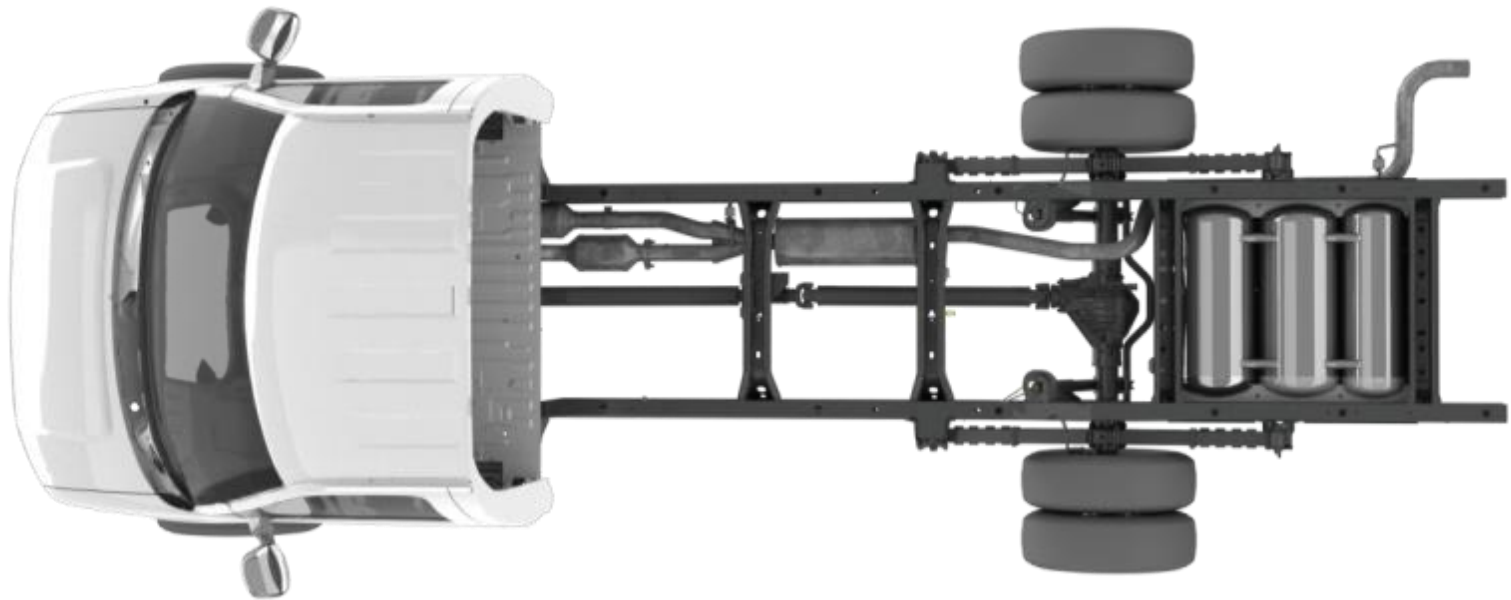
The four-tank LPG system is comprised of the following major components:

- Fuel Storage Tanks:
  - One Main Tank
  - Three Secondary Tanks
- Fuel Rails
- Fuel Injectors
- Fuel Lines



## Three-Tank LPG System Components

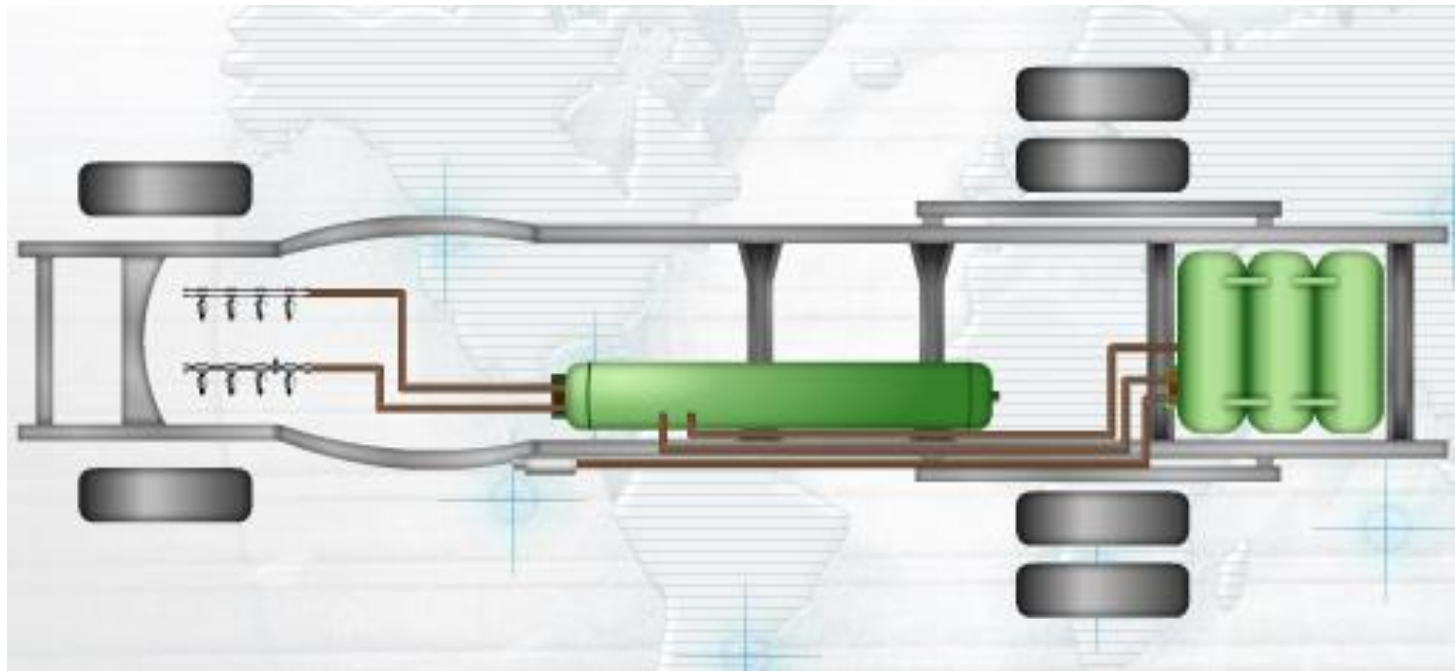
The three-tank LPG system does not incorporate a main tank located in the center of the vehicle. Fuel lines, located on the driver's side of the vehicle, connect to the CNG tanks in two locations: at the rear of the vehicle and to the engine's fuel rails in the front of the vehicle.



# LPG Fuel System Leak

Ensure that the ignition key is in the OFF position if a fuel leak is suspected.

**Warning:** Do NOT try to stop a leak by over-tightening any fitting as this will result in damage to the fitting, which may cause injury.



# GMC Savana and Chevrolet Express Airbags

The GMC Savana and Chevrolet Express are equipped with frontal and roof rail airbags.

The frontal airbags are mounted in the steering wheel for the driver and in the front instrument panel for the front passenger. Roof rail airbags are located behind the trim covering the roof rails on each side of the vehicle and in the right rear roof rail.

The dual pretensioner seatbelts for the front seats work together with the airbag system to protect the occupants in the event of a collision.

Frontal airbags deploy in moderate to severe frontal or near frontal impacts.

Roof rail airbags deploy in moderate to severe side impacts, certain rollover events, and severe frontal impacts.

The appearance of deployed airbags does NOT ensure that all stages of airbag deployment have occurred.



**Airbag Locations**

**Warning:** Anyone who is close to an airbag or touching an airbag when it inflates could be seriously injured or killed. If you cannot disconnect the battery power, do not place your body or any objects on or very close to any airbag module.

# Airbag Deployment

After disabling the power after airbag deployment, there are no cutting restrictions to a particular airbag.

If the roof rail airbags have deployed, all pillar and rail locations can be cut. If the roof rail airbag is not deployed, avoid cutting the rear pillar or upper rail near the location of the inflator; the inflator's location is visible by removing the trim. Cutting other portions of a roof rail airbag system is acceptable after the power is disabled.

Any non-deployed airbag can self-deploy in a fire. Do not expose any airbag module to a fire. This precaution will help prevent unwanted airbag deployment.

Each airbag has unique sensor locations throughout the vehicle. After a collision, wiring to the sensors might be damaged, which could initiate an unwanted deployment. Disconnecting the battery cables is the best way to reduce the likelihood of unwanted airbag deployment during a rescue.

**Warning:** The presence of a deployed airbag does not guarantee that the inflator module is inactive. To prevent injury, always assume that airbags are active before servicing.



# Disabling 12 Volt (12V) Power

Even if the airbags appear to have deployed, disabling 12V power is essential for personal safety.

To disable power, disconnect the negative (black) cable. After disabling 12V power, wait at least 1 minute to allow any un-deployed airbag reserve energy to dissipate.

Battery

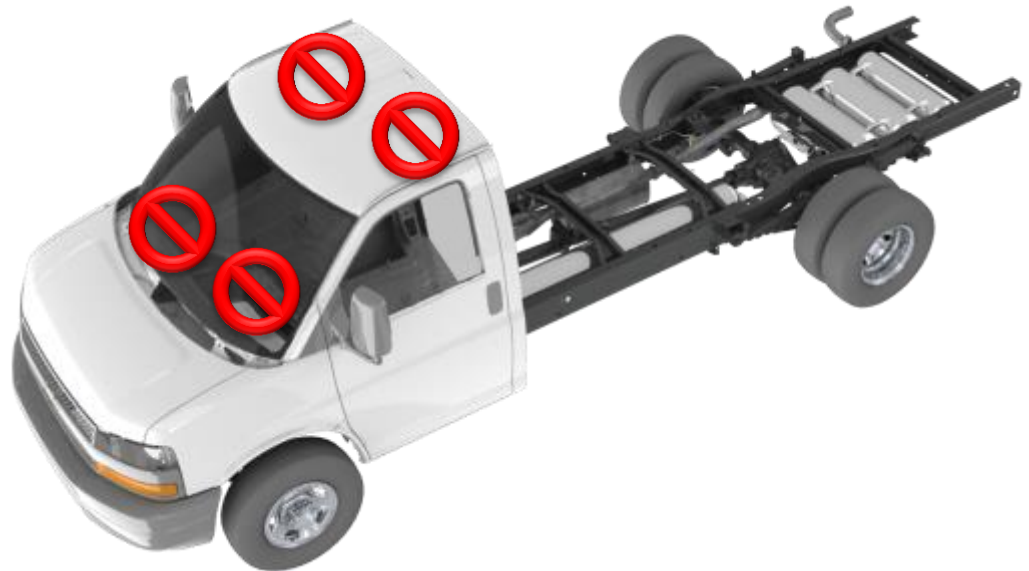


# Vehicle DO NOT CUT ZONES

Do NOT cut the following areas of the vehicle which contain airbag modules:

- steering wheel
- front instrument panel, passenger side
- roof rails, left and right sides

**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 airbag deployment, resulting in serious injury.



# First Responder Considerations

## Fire

LPG fuel within the LPG tanks is flammable. LPG is only flammable when LPG concentrations are between 2.15 - 9.7% LPG and oxygen.

In the event of an LPG fire, stop the fuel flow. If there's a secondary fire, extinguish natural gas flames using a carbon dioxide or dry chemical fire extinguisher.



# GMC Savana and Chevrolet Express Dedicated CNG Vehicles



# Vehicle Identification

The GMC Savana and Chevrolet Express are full-sized cargo vans used as fleet vehicles that contain low-emissions compressed natural gas (CNG), and are identified with CNG labels on the exterior and interior of the vehicle.

The CNG labels on the exterior of the vehicle are located:

- on the lower right side of the rear door
- near the fuel tank door
- within the gas cap door



## Vehicle Identification (continued)

The CNG labels in the interior of the vehicle are located:

- on the tank covers
- on the manual valve



# System Operation

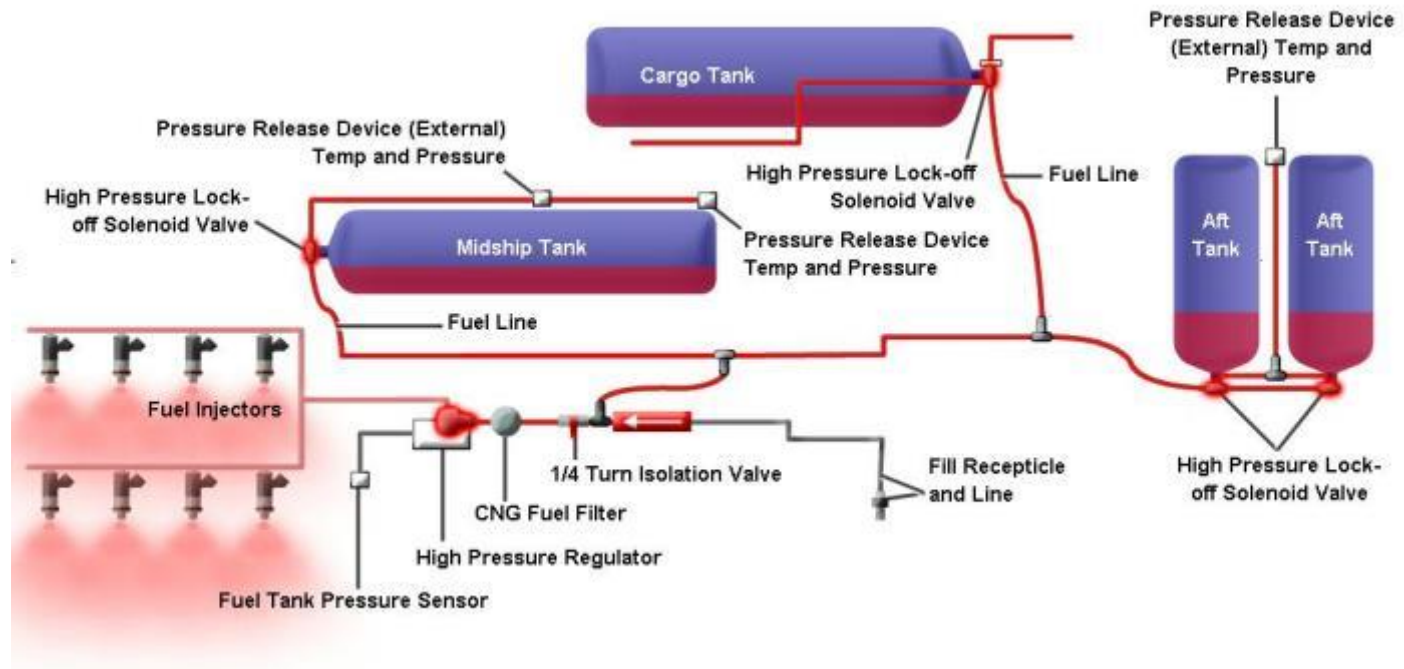
The GMC Savana and Chevrolet Express CNG cargo vans are equipped with a Vortec 6.0L V8 engine, designed especially for CNG operation.



# CNG System Components

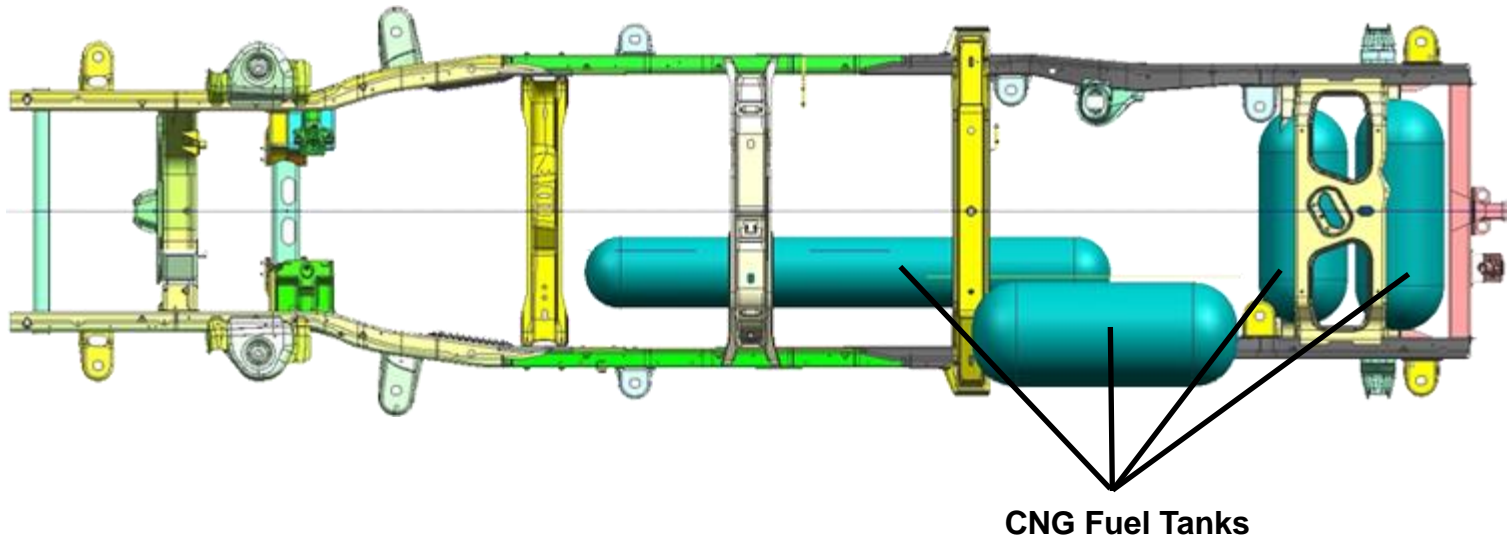
The CNG system is composed of the following:

- Fuel Storage Tanks:
  - Midship Tank
  - Cargo Tank
  - Aft Tanks
- High Pressure Lock-off Solenoid Valve
- Fuel Tank Pressure Sensor
- Fill Receptacle and Line
- High Pressure Regulator
- Fuel Lines
- Fuel Injectors
- 1/4 Turn Isolation Valve
- Pressure Relief Devices
- CNG Fuel Filter



# CNG Fuel Tanks

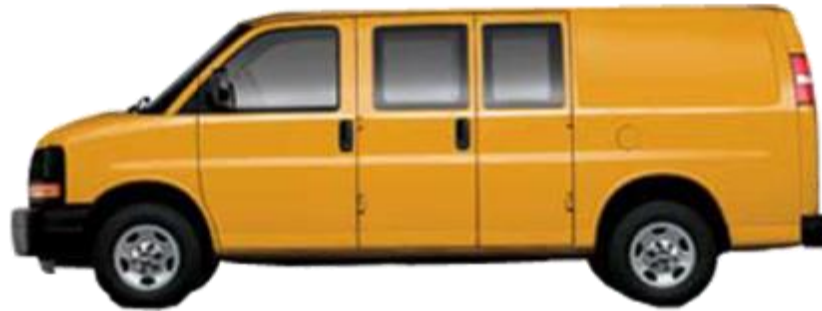
The GMC Savanna and Chevrolet Express are equipped with three CNG fuel tanks and an optional fourth tank. Two tanks are located in tandem behind the rear axle. One tank is located under the vehicle between the axles where a gasoline tank is typically positioned. The optional fourth tank is located in the cargo compartment.



# CNG Fuel System Leak

Ensure that the ignition key is in the OFF position if a fuel leak is suspected.

**Warning:** Do NOT try to stop a leak by over-tightening any fitting as this will result in damage to the fitting, which may cause injury.



# GMC Savana and Chevrolet Express Airbags

The GMC Savana and Chevrolet Express are equipped with frontal and roof rail airbags.

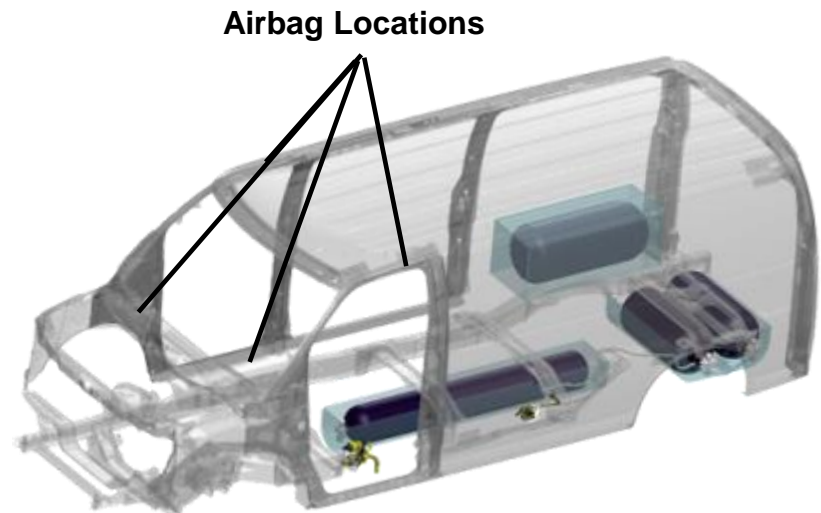
The frontal airbags are mounted in the steering wheel for the driver and in the front instrument panel for the front passenger. Roof rail airbags are located behind the trim covering the roof rails on each side of the vehicle and in the right rear roof rail.

The dual pretensioner seatbelts for the front seats work together with the airbag system to protect the occupants in the event of a collision.

Frontal airbags deploy in moderate to severe frontal or near frontal crashes.

Roof rail airbags deploy in moderate to severe side impacts, certain rollover events, and severe frontal impacts.

The appearance of deployed airbags does NOT ensure that all stages of airbag deployment have occurred.



**Warning:** Anyone who is close to an airbag or touching an airbag when it inflates could be seriously injured or killed. If you cannot disconnect the battery power, do not place your body or any objects on or very close to any airbag module.

# Airbag Deployment

After disabling the power after airbag deployment, there are no cutting restrictions to a particular airbag.

If the roof rail airbags have deployed, all pillar and rail locations can be cut. If the roof rail airbag is not deployed, avoid cutting the rear pillar or upper rail near the location of the inflator; the inflator's location is visible by removing the trim. Cutting other portions of a roof rail airbag system is acceptable after the power is disabled.

Any non-deployed airbag can self-deploy in a fire. Do not expose any airbag module to a fire. This precaution will help prevent unwanted airbag deployment.

Each airbag has unique sensor locations throughout the vehicle. After a collision, wiring to the sensors might be damaged, which could initiate an unwanted deployment. Disconnecting the battery cables is the best way to reduce the likelihood of unwanted airbag deployment during a rescue.

**Warning:** The presence of a deployed airbag does not guarantee that the inflator module is inactive. To prevent injury, always assume that airbags are active before servicing.



# Disabling 12V Power

Even if the airbags appear to have deployed, disabling 12V power is essential for personal safety.

To disable power, disconnect the negative (black) cable. After disabling 12V power, wait at least 1 minute to allow any un-deployed airbag reserve energy to dissipate.

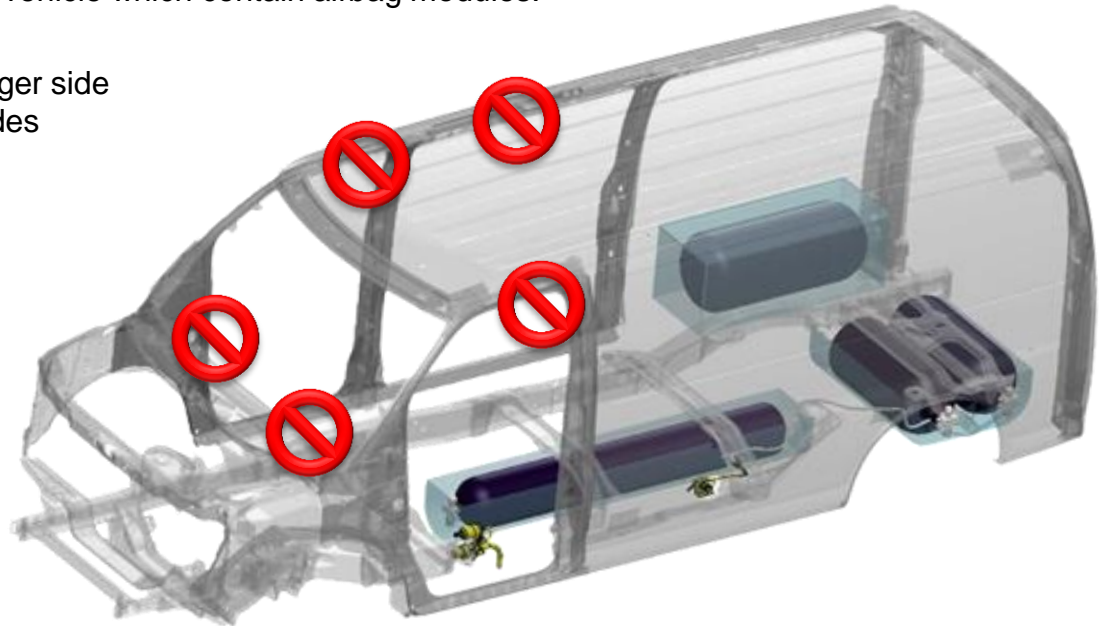
Battery



# Vehicle DO NOT CUT ZONES

Do NOT cut the following areas of the vehicle which contain airbag modules:

- steering wheel
- front instrument panel, passenger side
- roof rails, front left and right sides
- roof rails, right rear



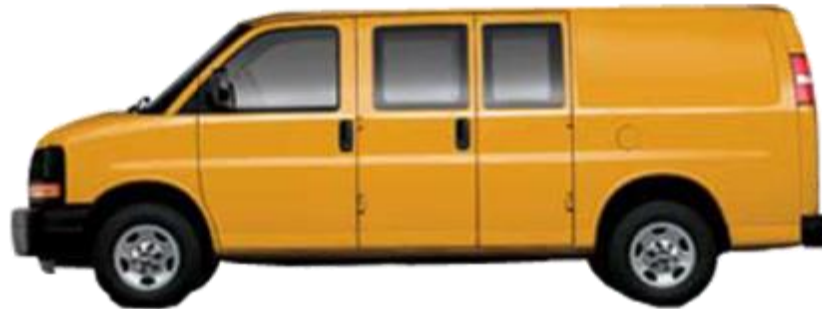
**WARNING:** Do NOT cut into the vehicle until the 12V electrical system has been disabled. Cutting into the vehicle prior to disconnecting and isolating the 12V electrical energy sources may cause airbag deployment, resulting in serious injury.

# First Responder Considerations

## Fire

CNG fuel within the CNG tanks is flammable. Natural gas only becomes flammable when CNG concentrations are between 5-15% natural gas and oxygen.

In the case of a natural gas fire, stop the fuel flow by turning the key to the OFF position. If any secondary fire emerges, extinguish natural gas flames using a carbon dioxide or dry chemical fire extinguisher.



# GMC Sierra and Chevrolet Silverado Bi-Fuel Vehicles

The GMC Sierra and Chevrolet Silverado bi-fuel vehicles operate on both gasoline and CNG fuel. The bi-fuel vehicles start on gasoline and switch to CNG after the engine has reached the appropriate operating temperature. The vehicles will operate on CNG unless the gasoline system is manually selected, the CNG supply is low, or there is a fault in the CNG system.



# Vehicle Identification

The bi-fuel GMC Sierra and Chevrolet Silverado are full-sized trucks that incorporate both a low-emissions CNG system as well as a conventional gasoline system. The bi-fuel vehicles can be identified by a CNG label on the right side of the rear bumper.



# Bi-Fuel Engine

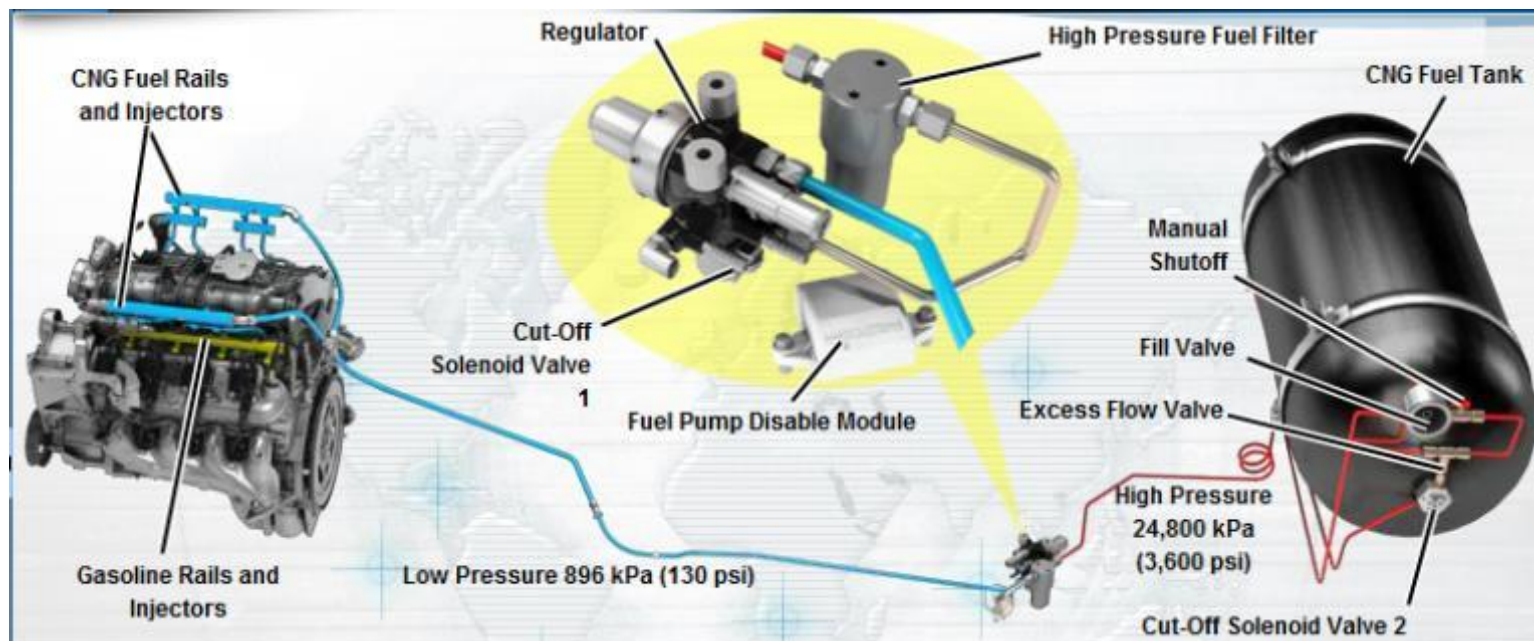
The GMC Sierra and Chevrolet Silverado bi-fuel vehicles are equipped with a Vortec 6.0L V8 engine, designed especially for CNG operation.



# Bi Fuel System CNG Components

The CNG system is composed of the following:

- CNG Fuel Rail and Injectors
- Gasoline Fuel Rail and Injectors
- Regulator
- High Pressure Fuel Filter
- Fuel Pump Disable Module
- Cut-off Solenoids 1 & 2
- Manual Shutoff Valve
- Fill Valve
- Fill Receptacle and Line
- Excess Flow Valve
- CNG Fuel Tank



# CNG Fuel Tank

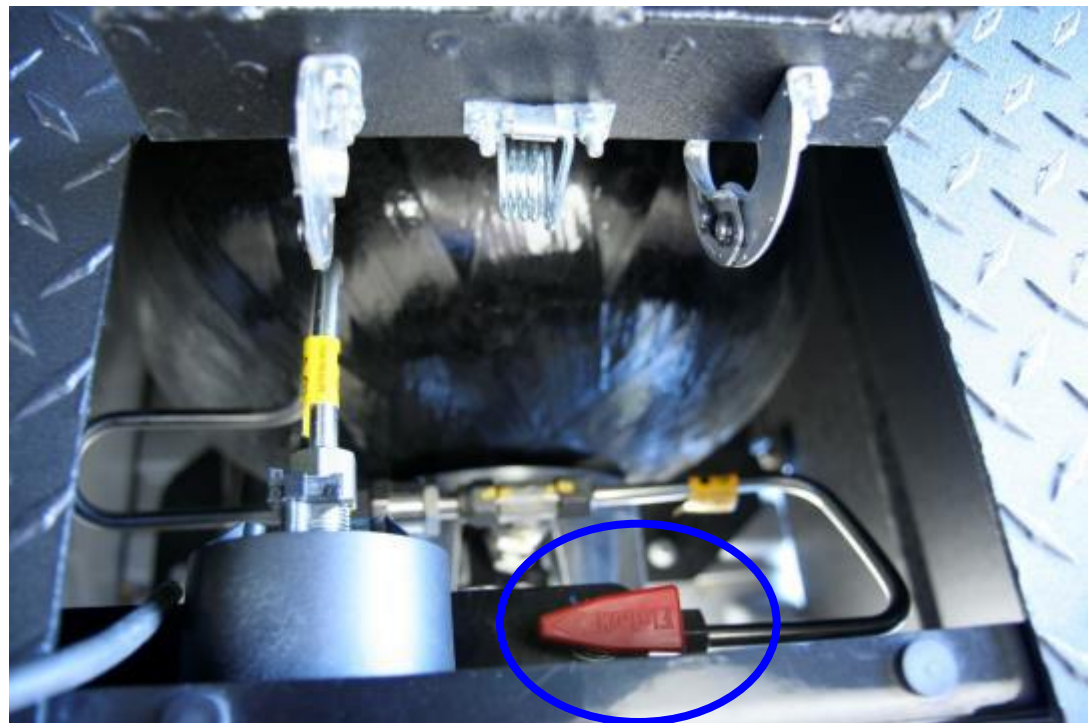
The GMC Sierra and Chevrolet Silverado bi-fuel vehicles are equipped with only one CNG fuel tank which is mounted in front of the truck bed.



# CNG and Gasoline Fuel System Leak

Ensure that the ignition key is in the OFF position if a fuel leak is suspected. In addition, the manual shut-off valve can be turned counter clockwise to stop the flow of fuel.

**Warning:** Do NOT try to stop a leak by over-tightening any fitting as this will result in damage to the fitting, which may cause injury.

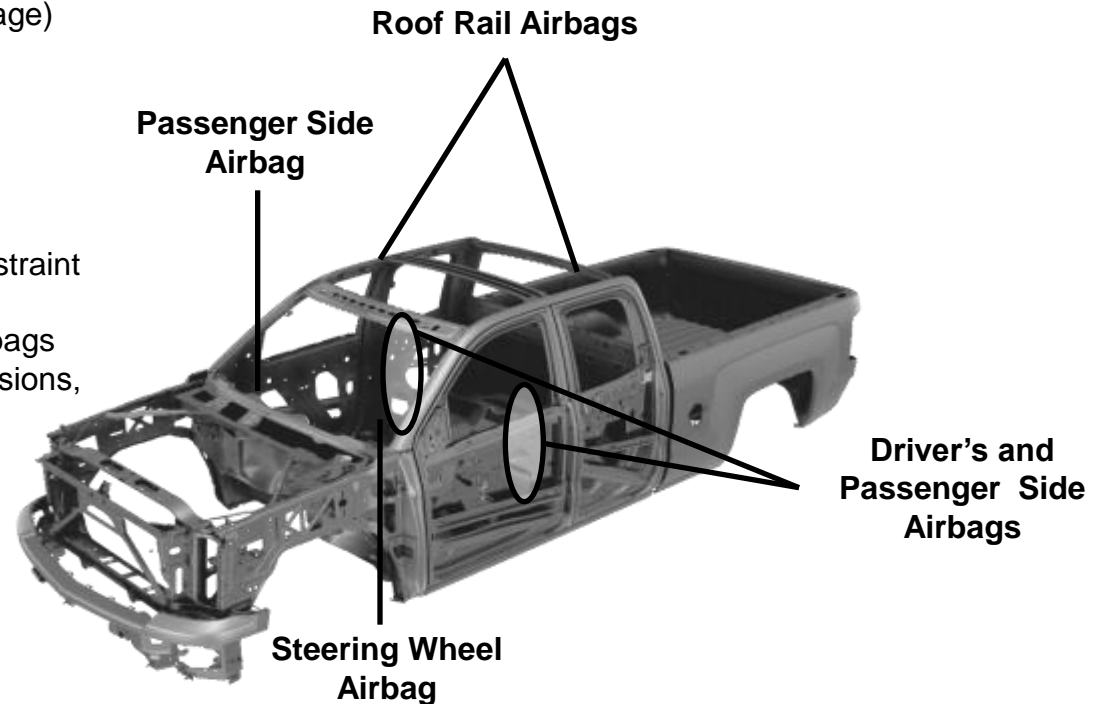


# GMC Silverado and Chevrolet Sierra Airbags

These vehicles contain six airbags located in the following areas:

- steering wheel (dual stage)
- instrument panel, passenger side (dual stage)
- side of driver's seat
- side of passenger seat
- left roof rail
- right roof rail

The dual-stage steering wheel and passenger instrument panel airbags vary the amount of restraint to the occupant according to the severity of the collision. In moderate frontal collisions, the airbags partially deploy (stage 1). In severe frontal collisions, the airbags fully deploy (stages 1 and 2).



**Warning:** Anyone who is close to an airbag or touching an airbag when it inflates could be seriously injured or killed. If you cannot disconnect the battery power, do not place your body or any objects on or very close to any airbag module.

# Airbag Deployment

After disabling the power after airbag deployment, there are no cutting restrictions to a particular airbag.

If the roof rail airbags have deployed, all pillar and rail locations can be cut. If the roof rail airbag is not deployed, avoid cutting the rear pillar or upper rail near the location of the inflator; the inflator's location is visible by removing the trim. Cutting other portions of a roof rail airbag system is acceptable after the power is disabled.

Any non-deployed airbag can self-deploy in a fire. Do not expose any airbag module to fire. This precaution will help prevent unwanted airbag deployment.

Each airbag has unique sensor locations throughout the vehicle. After a collision, wiring to the sensors might be damaged, which could initiate an unwanted deployment. Disconnecting the battery cables is the best way to reduce the likelihood of unwanted airbag deployment during a rescue.

**Warning:** The presence of a deployed airbag does not guarantee that the inflator module is inactive. To prevent injury, always assume that airbags are active before servicing.



# Disabling 12V Power

Even if the airbags appear to have deployed, disabling 12V power is essential for personal safety.

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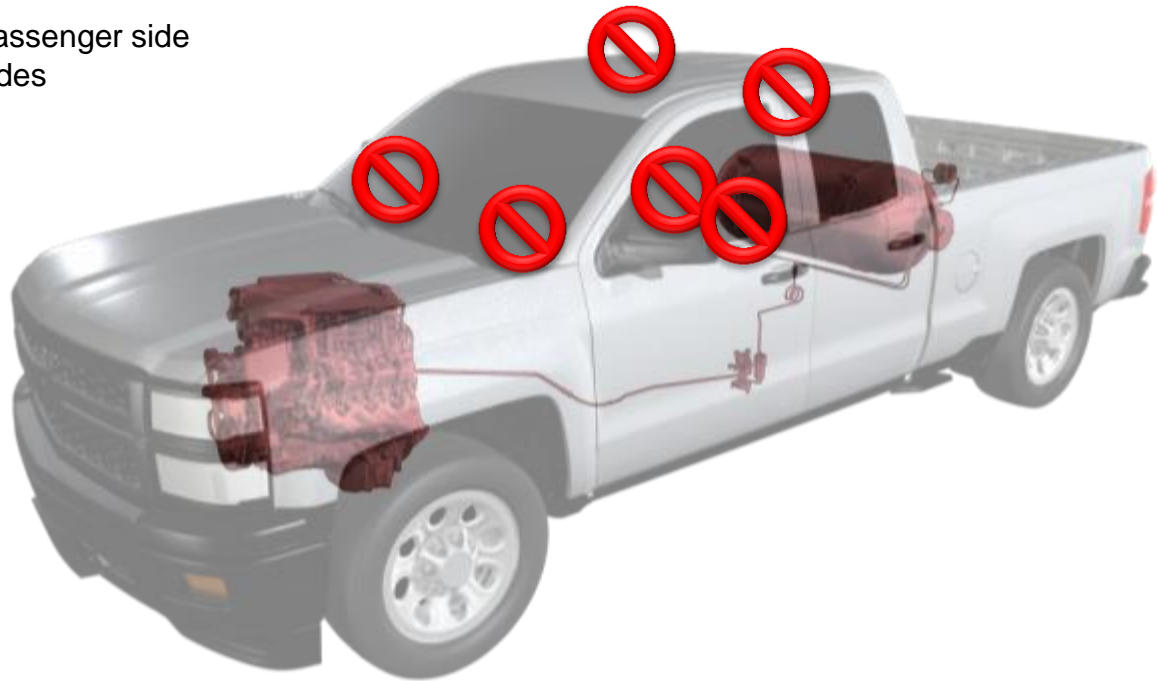
Battery



# Vehicle DO NOT CUT ZONES

Do NOT cut the following areas of the vehicle which contain airbag modules:

- steering wheel
- front instrument panel, passenger side
- roof rails, left and right sides
- side of driver's seat
- side of passenger seat



**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 airbag deployment, resulting in serious injury.

# First Responder Considerations

## Fire

CNG fuel within the CNG tanks is flammable. Natural gas only becomes flammable when CNG concentrations are between 5-15% natural gas and oxygen.

In the case of a natural gas fire, stop the fuel flow by turning the key to the OFF position. If any secondary fire emerges, extinguish natural gas flames using a carbon dioxide or dry chemical fire extinguisher.



# Conclusion

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

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



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GM Licensing Program Hdqtrs, 5775 Enterprise Ct. Warren, MI 48092, Attn: Licensing Coordinator