



# CNG FUEL SYSTEM SUPPLEMENT (1)

## SAFETY AND MAINTENANCE PROCEDURES







**NATURAL GAS VEHICLE  
CNG FUEL SYSTEM SUPPLEMENT (1)  
(FOR LABRIE UNITS)**



# Foreword

This document is the first of a two part series focusing on the Labrie CNG System. It also comes as a supplement to Labrie Operator's and Maintenance Manuals. Through the following pages, operators and maintenance personnel will find practical information on how the CNG system works as well as safety and maintenance procedures to get the most out of the new Labrie natural gas vehicle (NGV).

We sincerely hope that this document addresses all your questions and concerns about Labrie NGV's.

Any time you have a problem with a Labrie unit, you should contact your vendor first. They should be able to provide you with the proper help that you need, whether it is for parts or technical service.

## **FIRST THINGS FIRST:**

Do not forget to complete the owner registration form and to send it to Labrie Enviroquip Group. Make sure to fill out the in-service date. This date will be used as the start date of the warranty period. If the in-service date is not indicated, the warranty period will start 30 days after the delivery date.

## **IMPORTANT NOTE:**

**In the event of a motor vehicle accident or fire, all CNG containers should be visually inspected in accordance with the applicable standards. They should also be visually inspected at least every 36 months or 36,000 miles (58,000 km), whichever comes first, for damage and deterioration.**

**N.B.: Illustrations used in this manual are provided as examples only. Actual installation or type of devices could be different than pictured.**

# Liability

Labrie Enviroquip Group assumes no liability for any incidental, consequential, or other liability that might result from the use of the information contained in this document.

All risks and damages, incidental or otherwise, arising from the use or misuse of the information contained herein are entirely the responsibility of the user.

Although careful precaution has been taken in the preparation of this document, Labrie Enviroquip Group assumes no responsibility for errors or omissions.

# To Contact Labrie Plus

## In the U.S.

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LaFayette, GA 30728

**Toll Free:** 1-800-231-2771

**Telephone:** 1-920-233-2770

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**Sales Fax:** 1-920-232-2498

**Parts and warranty:** During business hours, 8:00 AM to 6:00 PM Eastern Standard Time

**Technical Support Service:** Available 24 hours

## In Canada

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**Parts Fax:** 1-418-831-7561

**Parts and warranty:** During business hours, 8:00 AM to 5:00 PM Eastern Standard Time

**Technical Support Service:** Available 24 hours

**Website:** [www.labriegrup.com](http://www.labriegrup.com)

**E-mail:** [sales@labriegrup.com](mailto:sales@labriegrup.com)

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**IMPORTANT: For technical support and parts ordering, the serial number of your vehicle is required. Therefore, Labrie Enviroquip Group recommends to keep record of the information found on the VIN plate, which is located in the cab.**

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# Introduction

This manual covers the safety and operational precautions related to the Labrie CNG system installed on your truck as well as important information on the maintenance, care and service of this system. For other CNG systems, please refer to the manufacturer's manual of your specific CNG system.

## What is CNG?

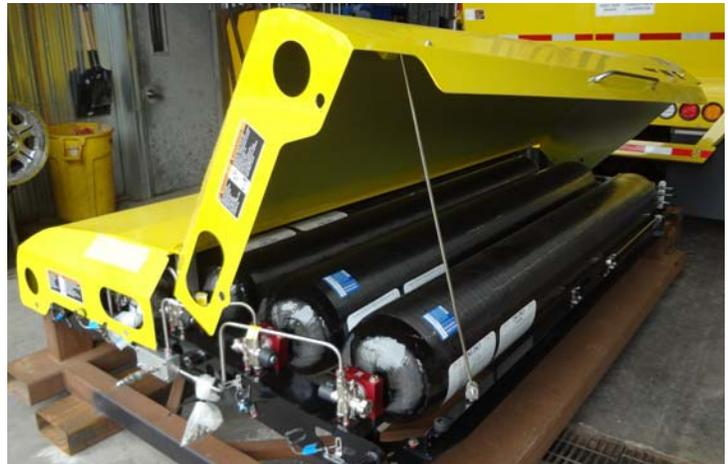


CNG stands for *Compressed Natural Gas* compared to LNG, which stands for *Liquefied Natural Gas*.

Natural gas is a fossil fuel substitute for gasoline, diesel or propane. It is a safer and more environmentally clean alternative to those fuels.

CNG is made by cleaning and compressing natural gas to less than 1% of the volume it occupies at standard atmospheric pressure. It is stored in containers at a pressure of 3,600 psi (248 bar) at 70° F (21° C).

**Figure 1-1 CNG containers and covers (for rooftop installation)**



**Figure 1-2 CNG containers (for behind-the-cab installation)**



Natural gas is a flammable gas. It is colorless, tasteless, and non-toxic. It is a light gas, weighing about two-thirds as much as air. It tends to rise and diffuses rapidly in air when it escapes from the system. CNG is odorized to facilitate detection of possible leakage. It is non-toxic but can cause asphyxiation when it displaces in a confined area without adequate ventilation.

Natural gas is a mixture of hydrocarbons, mainly methane ( $\text{CH}_4$ ), and is produced either from gas wells or in conjunction with crude oil production. Natural gas is used in the residential, commercial, industrial, and utility markets.

The interest for natural gas as an alternative fuel stems mainly from its clean burning qualities, its domestic resource base, and its commercial availability to end-users. Because of the gaseous nature of this fuel, it must be stored onboard a vehicle in either a compressed gaseous state (CNG) or in a liquefied state (LNG).

## **Chemical Properties**

The main constituent of natural gas is methane, which is a relatively unreactive hydrocarbon. Natural gas as delivered through the pipeline system also contains hydrocarbons such as ethane and propane, and other gases such as nitrogen, helium, carbon dioxide, hydrogen sulfide, and water vapor.

## Types of CNG Setup

There are three main types of setup that can be done on most Labrie units as far as CNG cylinder installation is concerned:

- ◆ Rooftop setup



- ◆ Behind-the-cab (or saddle) setup



- ◆ Tailgate setup

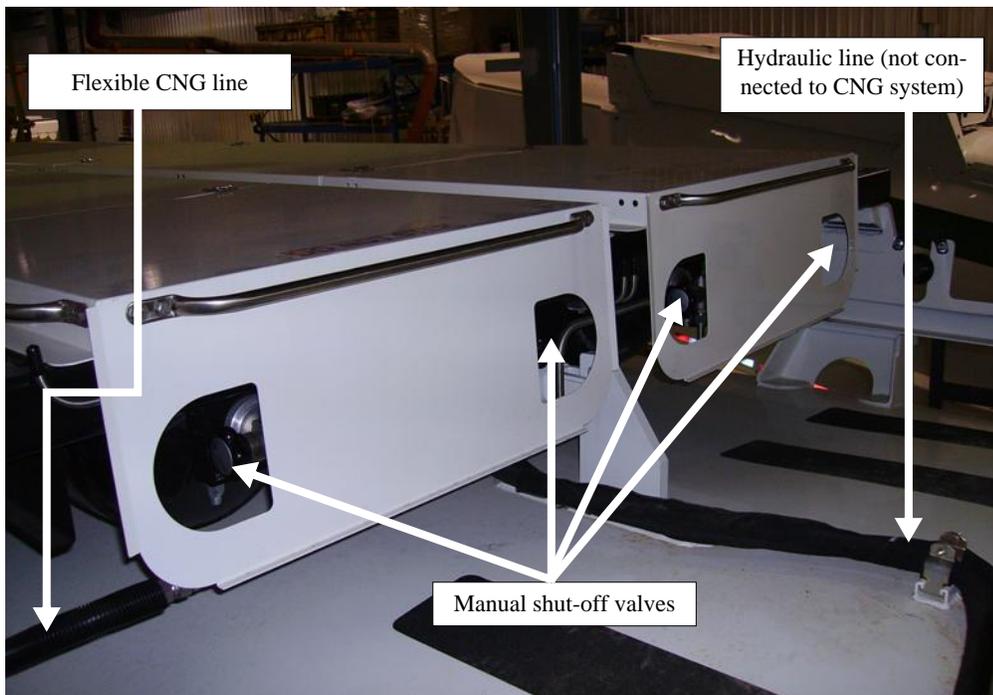


## Typical CNG Setup

The following is a brief description of a typical CNG fuel system setup:

- ◆ A 4-cylinder bank is installed on the top of the body.

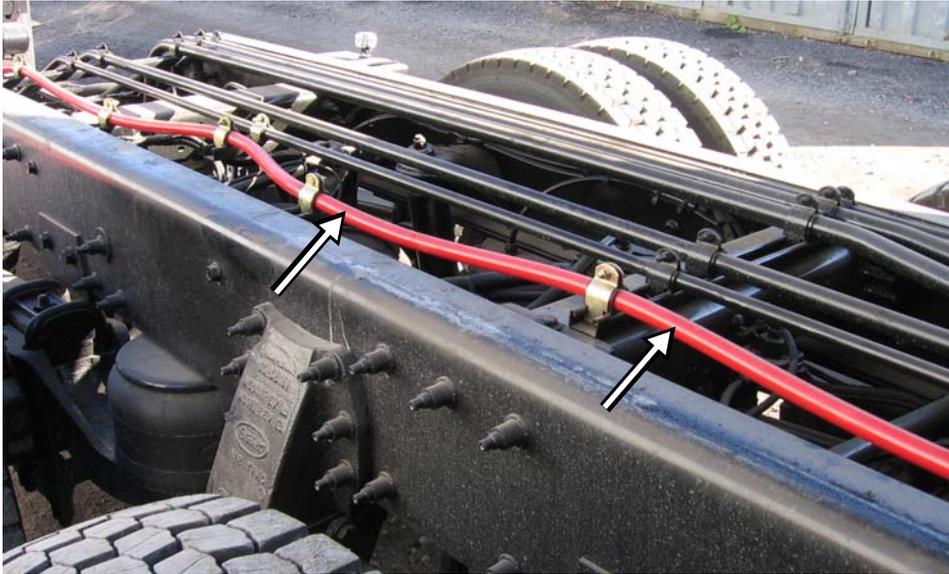




- ◆ Fuel high pressure line is installed.



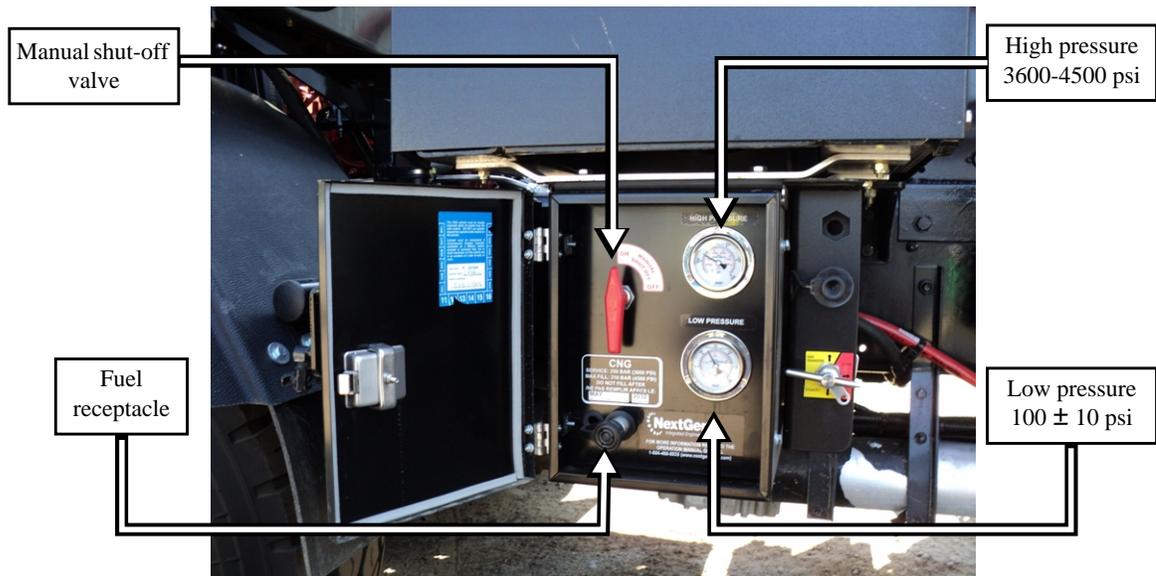
- ◆ Installation of a red flexible high pressure hose on the chassis.



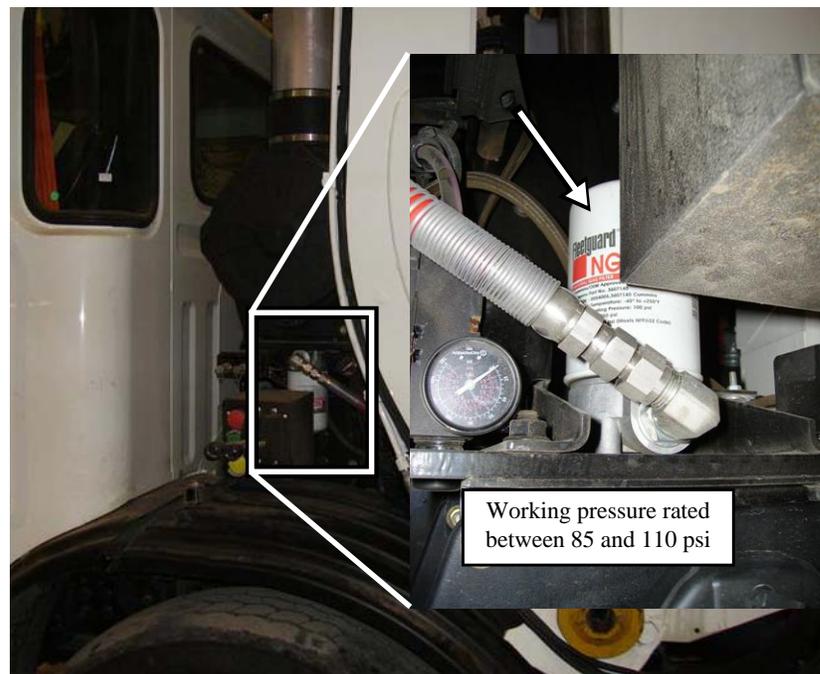
- ◆ Installation of the control panel.  
For more information on the Labrie CNG control panel, refer to the *CNG Fuel System Supplement (2): Control Panel and Operational Procedures*.



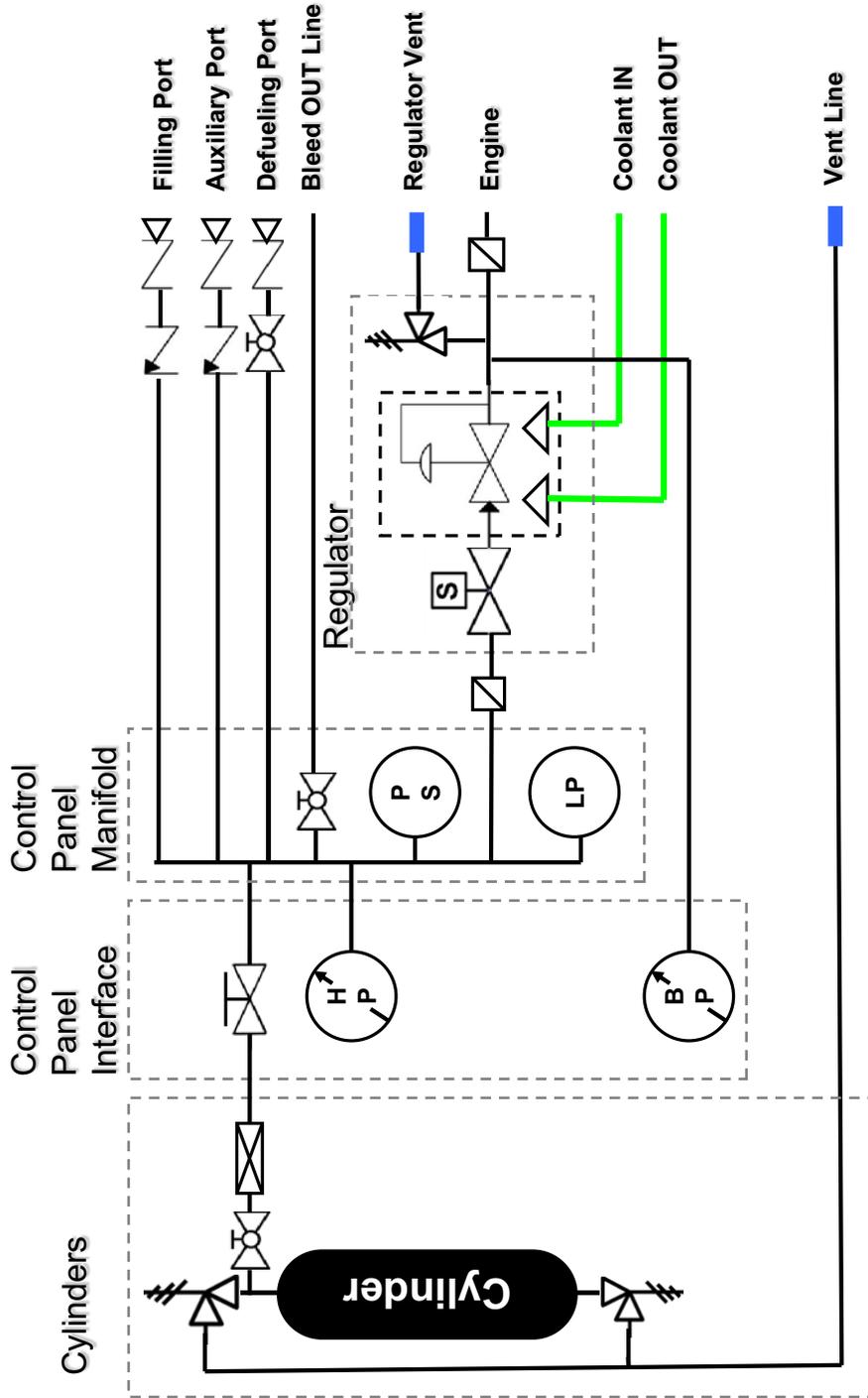
- ◆ Controls and gauges on the control panel (access door open).



- ◆ Installation of a CNG low pressure filter (the installation of the CNG fuel system by Labrie ends here; CNG parts that are beyond the filter are installed by the chassis manufacturer).



# CNG Fuel System - General Schematic



# 2

## Safety and Operational Precautions

DANGER, WARNING, CAUTION notations appear throughout this manual and on the decals that are placed on the truck and inside the cab.

### Conventions

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#### DANGER!



Indicates a hazardous situation which, if not avoided, **will** result in serious injury or death.

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#### WARNING!



Indicates a hazardous situation which, if not avoided, **could** result in serious injury or death.

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#### CAUTION!



Indicates a hazardous situation which, if not avoided, could result in **minor or moderate injury**.

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### Other Words of Warning

The words *Notes* and *Important* also appear in this manual and precede information which are vital to the proper operation and maintenance of the CNG vehicle.

### Basic Safety Notions

Despite our efforts to build a vehicle that is as safe as possible, the operator's safety certainly depends on the precautionary measures taken while operating the vehicle. If in doubt about these measures, refer to your supervisor.

Supervisors or Maintenance Department personnel with questions and concerns should contact LabriePlus.

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**CAUTION!**

Before operating the unit, it is the operator's responsibility to be thoroughly familiar with the instructions contained in the *Operator's Manual*.



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**DANGER!**

Always be aware of the vehicle's surroundings to make sure that no pedestrians, passersby, bystanders, or other people or vehicles are in any way exposed to any danger caused by the use of the CNG vehicle.



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**DANGER!**

Never get inside the hopper area when the engine is running. Only authorized personnel may do so following a lockout/tagout procedure (See *Locking Out and Tagging Out the Vehicle* on page 13).



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## Natural Gas Safety Instructions

Apply the following safety instructions at all times:

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**DANGER!**

Do not smoke around natural gas vehicles or near natural gas stations.



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**DANGER!**

A portable fire extinguisher must be available on the vehicle at all times.



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**DANGER!**

Pressure inside cylinder must not exceed 3,600 psi (248 bar) @ 70° F (21°C).



**DANGER!**

Maintenance (including refueling) on natural gas vehicles must be carried out by duly qualified and authorized personnel only as prescribed by the Authority Having Jurisdiction (AHJ). See the definition of *qualified person* and *qualified mechanic* on page 12.

**DANGER!**

**Explosion hazard:** Be *very careful* when trying to transfer compressed natural gas from or to another vehicle for refueling.

**DANGER!**

**Leak detection:** *Do not* start the engine if CNG leak is detected.

**DANGER!**

**Leak detection:** Avoid any open flame or spark close to the vehicle.

## Welding

**DANGER!**

Remove paint before welding or heating. Do not weld near lines that are pressurized or contain flammable fluids. *Never* weld near the natural gas cylinders.

**CAUTION!**

Disconnect all batteries and electronic modules prior to welding on body.

## Fire

The employer must inform and train all personnel on the measures that must be taken in case of a vehicle and/or loaded body catching fire.

First responders that come to the scene of a fire involving a CNG-powered waste vehicle must follow appropriate procedures in order to minimize the risk of injury or more damage. Those procedures, including emergency measures, are outlined in the chapter entitled “Emergency Response” of this document. Also, when fighting such a fire all applicable jurisdictional requirements must be met.

Anytime a loaded vehicle is *brought inside a garage*, fire extinguishers shall be close at hand.

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**DANGER!**

Do not perform any repair or maintenance on a vehicle that has not been unloaded.



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**CAUTION!**

Never substitute components of the CNG system. Always use original Labrie parts.



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The employer must also inform employees of an appropriate place to unload the body near the maintenance facility (preferably away from traffic, surface drains, and ditches).

## Definition of *Qualified Person* and *Qualified Mechanic*

### Qualified Person

A person who, by virtue of a recognized diploma, certificate, professional status or competence and who, by virtue of his or her education, training, experience or other special attributes, possesses expertise in a particular field, work or project.

Or:

A person who has been trained to perform a particular task and who, if applicable, holds a licence from the authority having jurisdiction (AHJ).

### Qualified Mechanic

All personnel engaged in activities such as discharging CNG fuel containers or the maintenance, repair, replacement, removal and testing of CNG fuel system or its components must be qualified mechanics.

A qualified mechanic must meet the definition of a qualified person.

## Discharge Of CNG From Vehicle Containers

The following are some specific recommendations about the discharge of CNG from vehicle containers:

- ◆ The venting or depressurization of a CNG container should only be performed by qualified personnel and in accordance with written procedures.
- ◆ The gas to be removed from the container shall be discharged into a closed transfer system or vented by an approved atmospheric ventilation method.
- ◆ A valve must be used to control the discharge of gas from high-pressure systems to a venting system.

- ◆ When depressurizing containers qualified personnel should do the following:
  - Depressurize containers only according to manufacturer's instructions.
  - Use grounding to avoid build-up of static electric charges.
  - Limit the gas release rate from CNG containers to a value not greater than that specified by the container manufacturer.
  - Secure containers during depressurization to prevent container movement.
- ◆ Direct venting of gas must be done through a vent tube that diverts the gas flow to the atmosphere.
- ◆ The vent tube must be gas-tightly connected to the container before venting
- ◆ All components of the vent tube must be grounded.

## CNG Container Inspections

CNG container inspections should be carried out whenever a vehicle is involved in an accident or fire that cause damage to any of its CNG containers, or whenever a container is subjected to a pressure greater than 125 percent of service pressure. Always follow the container manufacturer's recommendations to properly inspect CNG containers.

## Locking Out and Tagging Out the Vehicle

For any inspection, repair or general maintenance being done on the vehicle, whether on the road or at the shop, it is the employer's responsibility to establish and see to the application of a proper lockout and tagout procedure.

To lock out and tag out your vehicle:

1. Park the vehicle on safe, level ground and apply the parking brake (see Figure 2-1).

**Figure 2-1** Parking brake knob



2. Make sure the body is completely unloaded.
3. Switch off the hydraulic pump.
4. If maintenance has to be done downstream of the manual shut-off valve, open the supply control panel (see Figure 2-2) and shut the manual valve off (see Figure 2-3). If maintenance has to be done on the fuel lines between the CNG cylinders and the manual shut-off valve, manual cylinder valves have to be turned OFF (see Figure 2-4).

Drain fuel lines prior to working on them.

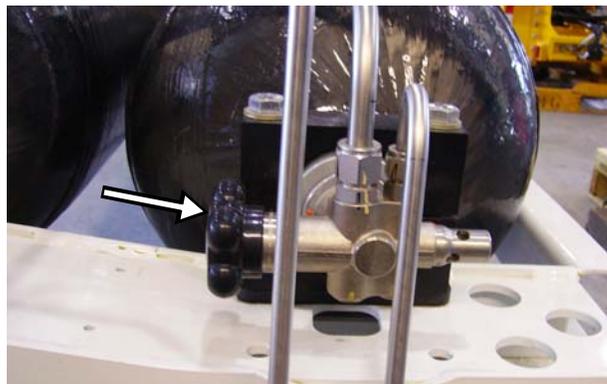
Figure 2-2 CNG supply control panel



Figure 2-3 Manual shut-off valve



Figure 2-4 Manual cylinder valve



5. Let the engine kill, remove the key from the ignition, store it in a safe and controlled area (preferably on yourself), and tape over the ignition switch.
6. Turn OFF and lock the master switch.

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**IMPORTANT:** If the battery set of your vehicle is equipped with a master switch (see Figure 2-5), you must turn it OFF.

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**Figure 2-5** Master switch



7. Chock all wheels.
8. Put an “OFF SERVICE” tag on the driver’s wheel and on the front windshield.
9. Use safety props to block any system that could move by gravity (open tailgate, etc.).
10. Drain all air tanks.
11. Verify and inspect any security device and/or mechanism to make sure that there is no bypass and that they are all functional.



# 3

## Maintenance

### NGV Maintenance

#### General Maintenance

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**WARNING!**



Maintenance and repairs on NGVs must be carried out by qualified and authorized personnel only. See *Definition of Qualified Person and Qualified Mechanic* on page 12 to know exactly what we mean by “qualified”.

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Your natural gas vehicle (NGV) is provided with standard parts and maintenance manuals, which explain the maintenance procedures related to the hydraulic, electrical and pneumatic systems of the vehicle. This section is only a supplement to these manuals.

Maintenance personnel should read and understand both parts and maintenance manuals as well as this document before doing any repairs or maintenance on the vehicle.

Effective maintenance work must also be conducted to ensure that the CNG fuel system continues to operate optimally and safely.

---

**WARNING!**



Before carrying out any maintenance work, cylinders and components might have to be de-fueled and/or purged. Refer to the CNG fuel system manufacturer’s operations manual for more information.

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The following are the NGV General Maintenance Instructions (ref.: applicable NFPA safety code):

1. Prior to performing repairs or maintenance, close the MANUAL SHUT-OFF valve and let the engine kill.

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**IMPORTANT: If maintenance has to be done on fuel lines between CNG cylinders and the control panel, manual cylinder valves have to be turned OFF.**

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2. Prevent any damage to natural gas cylinders.
3. Prevent natural gas cylinders from exposure to strong chemicals such as battery acid or metal cleaning solvents.
4. Store compressed natural gas cylinders to avoid any damage.
5. Re-install cylinders to their original configuration using approved gaskets, bolts, washers and so on, as per cylinder manufacturer's recommendations.
6. Prevent any lifting device from coming into contact with cylinders.

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**DANGER!**

Never use torches, welding or grinding equipment on or near high-pressure fuel lines or gas cylinders.



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**WARNING!**

Always apply the lockout/tagout procedure prior to doing any maintenance (see *Locking Out and Tagging Out the Vehicle* on page 13).



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**WARNING!**

Never attempt to tighten or loosen any connection while the system is pressurized.



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**CAUTION!**

Do not perform any mechanical work on system components and tubing that are under pressure.



## General Inspection

Inspections must be carried out by an Authority Having Jurisdiction (AHJ) certified inspector at least every 36 months or 36,000 miles (58,000 km), whichever comes first, to check for any signs of damage (impact, cut, abrasion, fire or excessive heat, weathering, chemical attack, etc.), as recommended by the AHJ. For more information, refer to the cylinder manufacturer's manual.

A general inspection of the fuel system should also be conducted every three months and should include the mounting system (brackets, bolts, etc), cylinders and plumbing components (e.g. valves, tubing, end plugs, pressure relief devices, and fittings).

Natural gas fuel system and containers should be visually inspected by an AHJ certified inspector after a motor vehicle accident or fire to make sure there are no potential problems within the system.

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**NOTE:** Cylinders with any signs of damage caused by heat or fire must be destroyed.

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**WARNING!**

Be cautious when lifting cylinder protective hoods into the upright position. Two persons are required to do this operation. Never do it by yourself. Also, always use the provided props to hold the hoods when inspecting the cylinders. Two persons are also required to replace the protective hoods. Be careful not to hit the hood sides against the cylinder pipes when lowering the hood.

## Gas Cylinders, Piping and Hoses

All gas cylinders and accessories such as piping, hoses, gauges, vents and control devices must be maintained in proper operating condition. Hoses that are kinked or worn, as well as damaged fuel lines, must be replaced and not repaired.

After original installation, vehicle-fueling hoses shall be visually inspected on a regular basis to ensure safe operation.

**WARNING!**

Any repairs, maintenance, or modifications to NGVs must comply with the latest codes and standards set out by the NFPA (in the U.S.) or by the CSA (in Canada). These codes and standards are locally enforced by the Authority Having Jurisdiction (AHJ).

## Gas Cylinder Depressurization

The venting or depressurization of a compressed natural gas cylinder shall be performed only by trained personnel using written procedures and codes applicable in your jurisdiction and enforced through an AHJ. Cylinder venting or depressurization written procedures may vary from one AHJ to another. Refer to your local AHJ to know the proper written procedures in your area.

The gas to be removed from the cylinder shall be discharged into a closed transfer system or shall be vented by an approved method of atmospheric venting.

## Direct Gas Venting

Direct gas venting shall be done through a vent tube that will divert the gas flow to atmosphere. The vent tube shall have gas-tight connection to the cylinder prior to venting, and all components shall be properly grounded. The vent tube shall not be provided with any feature that would limit or obstruct gas flow.

The process of direct gas venting shall be carried out in compliance with the latest codes and standards as well as relevant AHJ-approved safety procedures.

**DANGER!**

Use proper grounding to prevent static electrical charge build-up.

**WARNING!**

Maintenance and repairs on NGVs must be carried out by QUALIFIED and AUTHORIZED personnel only.

---

## Draining Vent Lines

As you may know, water build-up can corrode the various components of a CNG system. In freezing weather, water becoming ice can cause damage to pipes. To help prevent such situations, the vent lines should be drained on a monthly basis. However, if your system is functioning in damp weather conditions, draining of vent lines should be performed more frequently. In case a cap is not installed on the vent tube, this tube should be drained immediately. Reinstalling a cap is mandatory afterwards. As the vent tubes are not under pressure, it is safe to take the cap off.

**DANGER!**

Make sure that you loosen or remove the drain vent lines, NOT the fuel line. As the fuel line contains high pressure gas, loosening it or removing it can result in serious injury.

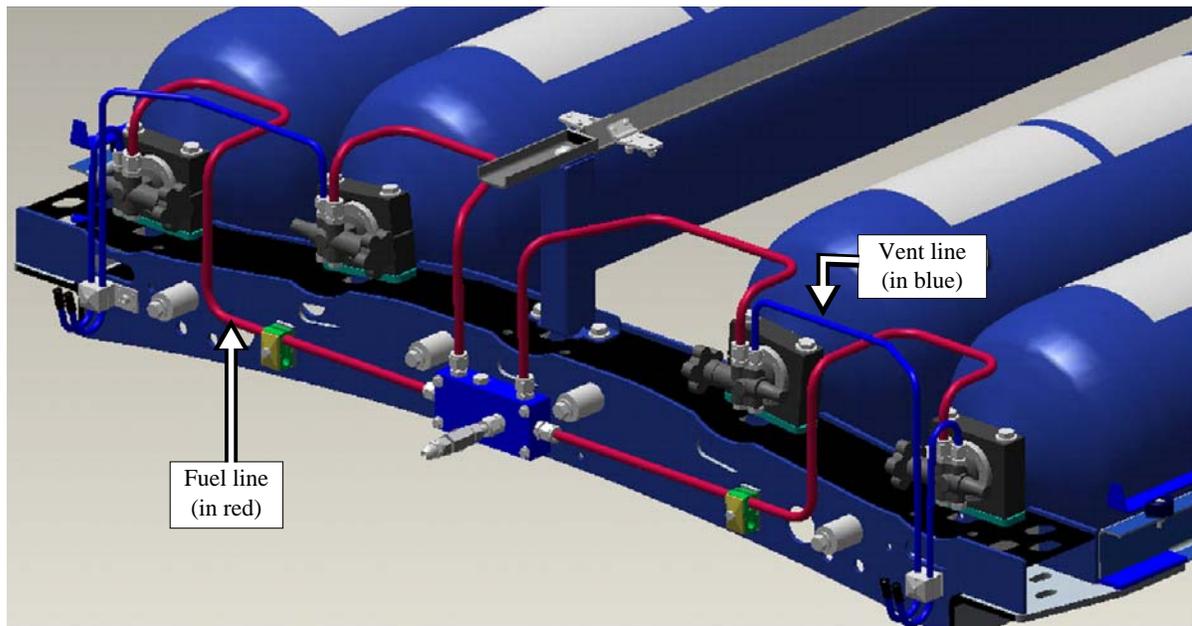
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**NOTE: The vent line is located closest to the valve handle.**

Vent lines can be drained in various ways depending on the CNG system you are using. What is depicted in Figure 3.1 is an example of a CNG system. Your system may be different. For the system depicted in Figure 3-1, draining vent lines can be performed this way: disconnect the vent lines from the valves and, with the use of an air hose, blow air through the vent lines. It is also possible to completely remove the vent lines and tilt them upside down to force the water out.

The vent lines should generally be drained wherever there is possible accumulation of water. Make sure that the vent lines on both sides of the cylinders are well drained.

Figure 3-1 Vent and fuel lines (example setup)



## System Testing and Leak Detection

### CNG System Testing and Leak Detection

The complete CNG assembly shall be leak tested on a regular basis.

A CNG leak can be easily detected using non-corrosive fluid applied on hose connections and pipe fittings or by using hand-held leak detector (see Figure 3-2). The following procedure can be applied for leak detection:

1. Remove gas cylinder covers to access gas cylinder delivery system.
2. Using a non-corrosive solution, apply a small quantity of fluid on suspicious fittings and/or hoses. A leaking joints will produce small bubbles as the gas leaks from the faulty component.
3. When using a gas detector, get its sensor close to the fitting or hose coupling to get confirmation of gas leakage.
4. If a leakage is detected, proceed with the proper repairs. Refer to qualified and authorized personnel.
5. Re-install gas cylinder covers after each maintenance work, inspection or repair.

#### **WARNING!**



Any repairs, maintenance or modifications to NGVs must comply with the latest code. Refer to local authorities for the applicable code and further information.

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**Figure 3-2 Gas leak detector**

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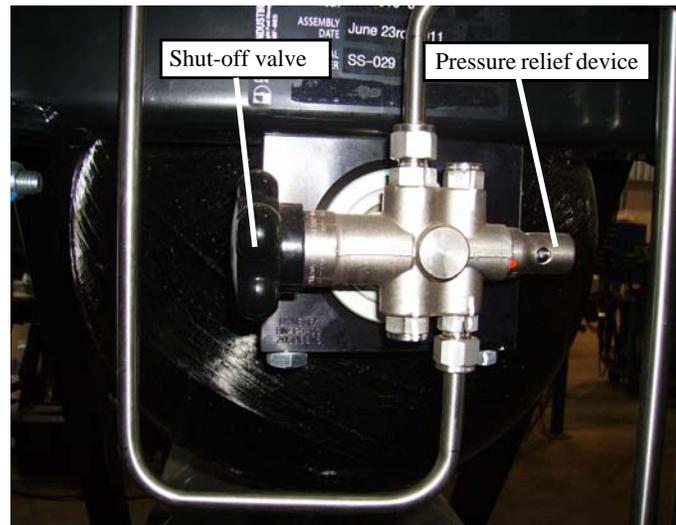
**NOTE:** Gas leak detector must be used as per the manufacturer's safety and operational procedures.

One way to protect the CNG fuel system from leakage problems is to keep it clean. Surface contamination is to be avoided. No particles or foreign material should enter the components that are part of the fuel system.

## Shut-Off Valve and Pressure Relief Device on Cylinders

Each CNG cylinder is connected to a pressure relief device and a shut-off valve in order to prevent cylinder pressure from exceeding maximum operating pressure. Refer to the cylinder manufacturer's manual for proper inspection procedure.

**Figure 3-3 Shut-off valve and pressure relief device**



## NGV Accident or Fire

If the vehicle is involved in an accident (e.g. collision) or fire causing damage to any CNG cylinder, or if a cylinder is subject to a pressure greater than 125 percent of service pressure (over 3,600 psi [248 bar] @ 70° F [21°C]), the CNG cylinder shall be replaced or removed, inspected and retested in accordance with the document under which it was originally manufactured before being returned to service (as indicated in the AHJ code).

If the vehicle is involved in an accident or fire causing damage to any part of the CNG fuel system, the system shall be repaired and reinspected before being returned to service, as per the AHJ code.

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### WARNING!



Any repairs, maintenance or modifications to NGVs must comply with the latest NFPA/CSA applicable code. Refer to local authorities for further information.

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### WARNING!



Always apply the lockout/tagout procedure prior to doing any maintenance work (see *Locking Out and Tagging Out the Vehicle* on page 13).

---

### WARNING!



Maintenance and repairs on NGVs must be carried out by QUALIFIED and AUTHORIZED personnel only.

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**DANGER!**

Never use torches, welding or grinding equipment on or near high-pressure fuel lines or gas cylinders.



**IMPORTANT:** If your NGV vehicle is involved in an accident, conduct a visual inspection of the containers and the CNG fuel system. If there is damage to any of the cylinders or to the fuel system itself, follow the instructions of the manufacturers of these items. If containers sustain level 3 damage, proceed to their replacement. If overpressurized, containers must be replaced and disabled. If containers have been exposed to fire, follow container manufacturers' recommendations.

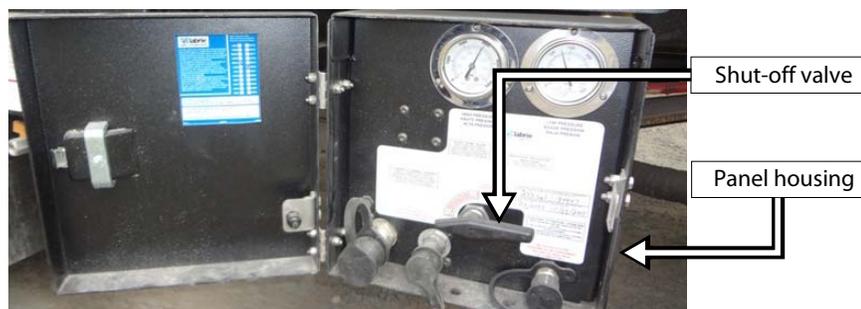
## Coalescing CNG Filter

The CNG fuel system is fitted with a coalescing filter located inside the control panel (see Figure 3-5). This filter is used to make sure the CNG fuel stays clean. A filter element inside the filter bowl should be drained every 1,500 miles (2,400 km) and replaced every 3,000 miles (4,800 km) or 500 hours, whichever comes first.

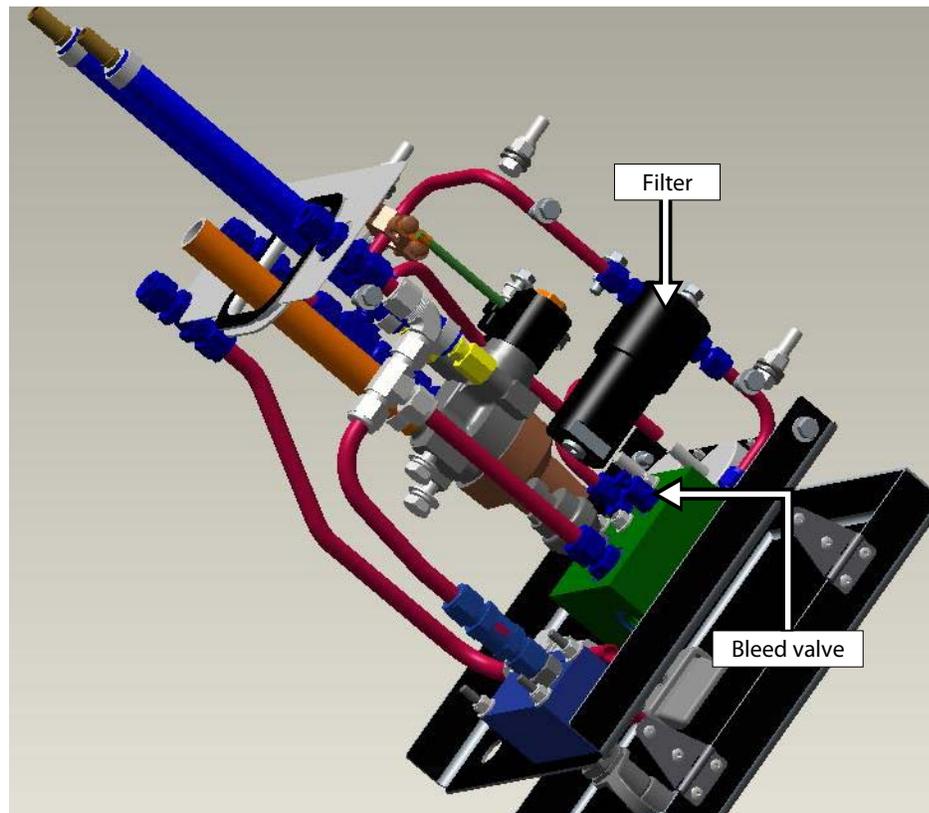
To drain or replace the filter element, apply the following procedure:

1. Close the shut-off valve on the CNG control panel (see Figure 3-4).
2. Start the truck and let the engine kill.
3. Remove the control panel housing (see Figure 3-4).
4. Open the bleed valve to safely let the CNG gas out of the pipes.
5. Once done, close the bleed valve.
6. Drain or change the filter element. To drain the filter element, do the following:
  - 6 a. Unscrew the plug at the bottom of the filter bowl.
  - 6 b. Once the drainage is completed, screw back the plug in place.
7. Use an appropriate solution to check for leaks.
8. Ensure the connections are bubble-free.
9. If no leaks are noticed, put back the control panel housing.
10. Open the shut-off valve.

**Figure 3-4 Control panel**



**Figure 3-5 Coalescing filter**



## Defueling Procedure for CNG Systems

The defueling procedure is used to remove gas partly or totally from the CNG system. The gas may be transferred to another truck (if permitted by local authorities) or to a fueling station. It may also be exhausted into the atmosphere (if permitted by local authorities).

To defuel the system proceed this way:

1. Shut off the engine and apply the tagout and lockout procedure (see *Locking Out and Tagging Out the Vehicle* on page 13).
2. Connect a grounding cable from the defueling station to the unit to avoid electrostatic discharge. In truck-to-truck transfer, connect a grounding cable between both trucks and another grounding cable from one of the trucks to the ground to avoid electrostatic discharge.
3. Open the access door of the CNG control panel and turn the manual shut-off valve (see Figure 2-3) to the “Closed” position.
4. Remove cap from the defuel receptacle (see Figure 3-6).
5. Make sure the host system is empty or depressurized. Also be sure that its inlet is opened.
6. Connect the CNG transfer hose by sliding the quick-connect collar up.

7. Attach transfer hose of the host station to the defuel receptacle. Use caution in doing so.

**CAUTION!**

Make sure that all safety precautions listed in the safety section of this manual have been taken before defueling the system.



8. On the right-hand side of the control panel, you will find a three-way valve (see Figure 3-6).
9. Slowly turn the valve handle to the “Gas Transfer” position.
10. Slowly open the manual shut-off valve (see Figure 2-3).
11. Verify that there is no gas leakage during fuel transfer. Check connections for gas leaks.

**WARNING!**

If gas leakage is detected, turn OFF the shut-off valve. Slowly turn the three-way valve to the “Exhaust” position to depressurize the circuit. Then, repair the leakage.



12. Once the gas transfer is complete, turn the manual shut-off valve of both systems to the “Closed/Off” position.

In truck-to-truck transfer (if permitted by local authorities), the defueling process can keep running until pressure is equal on both systems. In truck-to-(de)fueling station transfer, the defueling process keeps running until truck pressure gauge reads 0 psi. As for exhausting fuel into the atmosphere (if permitted by local authorities), the defueling process keeps running until 0 psi pressure is achieved.

With the exhausting process, there will always be natural gas pressure inside the system equivalent to the atmosphere pressure. That is why it is important to purge the system before proceeding with maintenance.

13. Slowly turn the three-way valve handle to the “Exhaust” position.  
This step is important. You will not be able to disconnect the transfer hose unless this step is performed first. Natural gas remaining in the hose will vent into the atmosphere.
14. Turn the three-way valve handle to the “Closed” position. Use a lock pin or a lock to secure the handle.
15. Disconnect the transfer hose from the defuel receptacle.
16. Replace cap on the defuel receptacle.

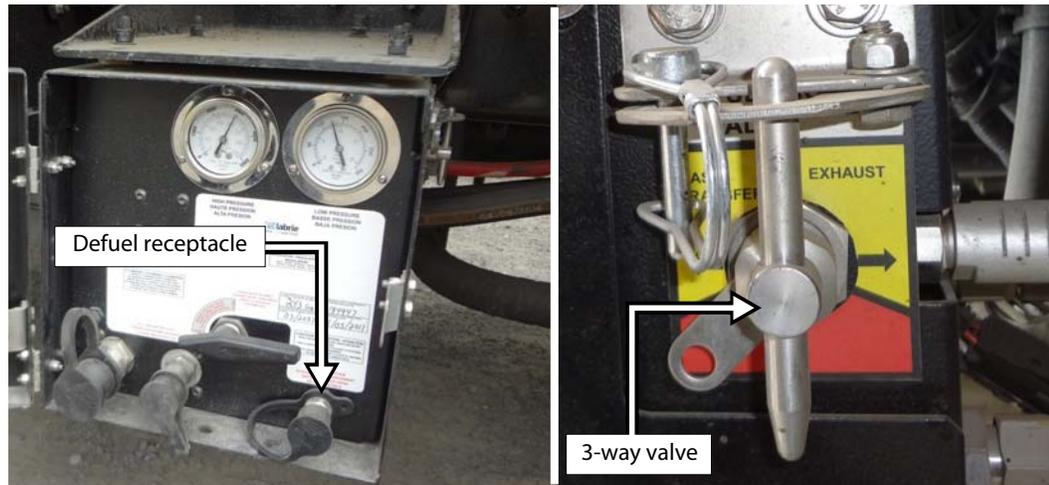
**WARNING!**

The three-way valve handle must be turned to the “Closed” position before operating the vehicle.

Both main shut-off valve and three-way valve handles shall be turned slowly to avoid damage to the pressurized components.



Figure 3-6 Defueling system



## Electrical Schematics

In every Labrie CNG-powered truck a set of electrical schematics and diagrams is supplied for reference. These documents are usually located in a plastic pocket within the cab. The set includes, among other things, a wiring diagram of the gas detection system and an installation schematic for the CNG control panel.



# 4

## Emergency Response

This section deals with the measures to be applied in the event of an emergency. The information herein is intended for first responders facing an emergency situation caused by an accident or fire involving a natural gas vehicle.

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**NOTE:** To find out if the vehicle runs indeed on natural gas, try to locate a blue sticker on the truck, which has the letters CNG on it (see Figure 4-1). This sticker is usually affixed to the right side of the tailgate. To know the total volume of CNG contained in the truck's tanks, locate the sticker shown in Figure 4-2 on the body left side.

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Figure 4-1 CNG sticker



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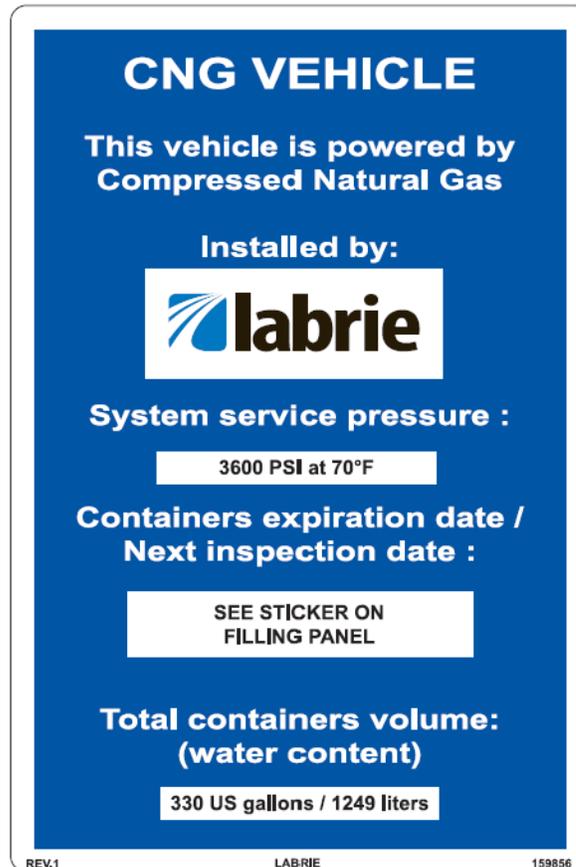
**WARNING!**



The pressure in the truck's CNG system is 3600 psi or more when the system is full. It is therefore important not to cut the CNG fuel lines.

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Figure 4-2 CNG sticker on body left side



## Emergency measures

- A. **If the vehicle has been damaged or if a leak has been detected**, apply the following measures:
- ◆ Eliminate all ignition sources such as fire, sparks, electronic devices, lights and electrostatic charges. Do not smoke near the vehicle or light flares.
  - ◆ Turn OFF the ignition switch (this will close the solenoid valve), apply the parking brake and disconnect the main power supply (usually located near the battery compartment).
  - ◆ If it is safe to do so, close the manual shut-off valve (Figure 2-3), close the tank valves (Figure 2-4) and check for leaks in the CNG fuel system near the damaged area using the senses of sight, hearing and smell. CNG is odorized and can be detected by smell.
  - ◆ Prevent pedestrians and drivers from getting too close to the area affected by the accident or fire.
  - ◆ Open the cab doors to let fresh air in.
  - ◆ If the vehicle is inside, open windows and doors to allow ventilation and avoid turning on lights or electronic devices that could create a spark. Pay particular attention to ignition sources, especially those near the ceiling, as natural gas will rise to the ceiling.
  - ◆ Be aware that residual gas may still escape from the storage system, even if the ignition switch has been turned off and the manual shut-off valve has been closed.

- ◆ Inform towing operators that the damaged vehicle is an NGV (Natural Gas Vehicle).

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**NOTE: If there is a CNG leak, it should be plugged before the truck is towed.**

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- ◆ Have any necessary repairs performed by a service technician qualified in servicing natural gas powered vehicles.

**B. If the vehicle is on fire, apply the following measures:**

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**WARNING!**



- ◆ Do NOT apply water to tanks as this will prevent the pressure relief valves from activating, which could result in catastrophic tank failure (high pressure gas rupture).
  - ◆ After 5 to 10 minutes in a fire without pressure relief valve activation, the pressure inside the tanks can increase to 5000 psi or more.
  - ◆ The burst pressure of an intact CNG tank is 8000 to 9000 psi.
- 

- ◆ Establish an 80 to 100 foot (24 to 30 metre) safety zone.
- ◆ If the flames do not touch the CNG tanks, they can be fought using normal response tactics.
- ◆ If, on the other hand, the flames touch the tanks even slightly or if the tanks are on fire, it is best to let the vehicle burn and monitor secondary hazards (e.g., the risk of damage to other surrounding structures or vehicles).
- ◆ When a pressure relief valve is activated, a jet fire often appears, which can go out and re-ignite several times.
  - Normally, a pressure relief valve installed on a CNG tank will take 2 to 5 minutes to activate. Then, it will take about 5 minutes for the complete evacuation of the gas, but this may vary depending on the amount of fuel in the system.
  - The tank can withstand flames for a total of 20 to 30 minutes.
- ◆ Inform towing operators that the burnt-out vehicle is an NGV (Natural Gas Vehicle).

# labrie*plus*

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