

# LNG REFUELLING INSTRUCTIONS

## SUMMARY FOR DRIVERS



This document was compiled under the supervision of the National LNG Platform and in collaboration with the following parties:



**ROLANDE**



**SCANIA**

**LNG REFUELLING INSTRUCTIONS**

VERSION 2016-01

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# Introduction

This is the summary of the instructions for refuelling LNG at the various locations operated by Shell, Rolande LNG, ENN, PitPoint and ENGIE. The summary is intended as a reference manual for drivers and other personnel following instructions at these locations, to aid them in the period immediately after receiving instructions at one of the filling stations.

This summary has been divided into the following chapters:

- Overview
- Physical properties of LNG
- Layout of filling stations
- Refuelling procedure
- A typical transaction
- Emergency procedures
- Authorisation

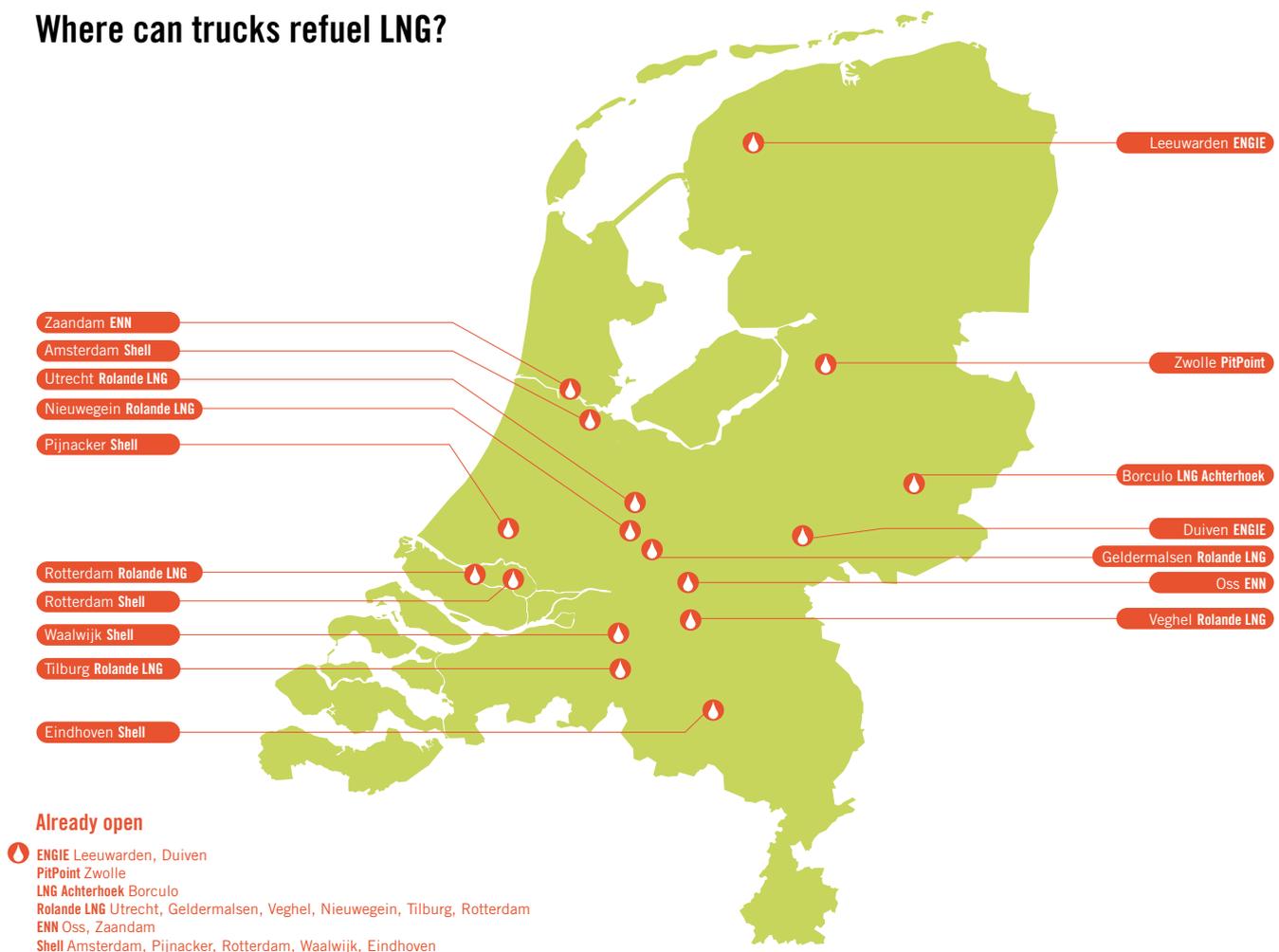
If you have any question or wish to apply for refuelling instructions at one of the filling stations, please get in touch with your fuel supplier or contact the National LNG Platform by sending an email to: [info@nationaallngplatform.nl](mailto:info@nationaallngplatform.nl)

# 1. Overview

We can observe a strong increase in the demand for LNG (Liquefied Natural Gas). LNG is an attractive and sustainable alternative to diesel fuel, for the following reasons:

- It is considerably less expensive than diesel fuel;
- It is a clean fuel that releases significantly lower volumes of nitrogen, carbon and particulates than diesel fuel;
- It is non-corrosive and leaves fewer pollutants in the engine itself;
- Engines running on LNG produce less noise, meaning that delivery times in urban environments can be extended.

## Where can trucks refuel LNG?



Map of refuelling locations in the Netherlands as of 1 March 2016

## 2. Physical properties of LNG

Liquefied Natural Gas (LNG) is natural gas that has been converted to liquid form via cooling and condensation. LNG has the following physical properties:

- LNG is clear, colourless and odourless;
- LNG is non-corrosive and non-toxic;
- In liquid state, LNG's volume is 600 times smaller than in its gaseous state. LNG is easy to transport, without any further compression being required;
- LNG that is spilled quickly evaporates and vaporises without leaving any residues. LNG that is spilled in a closed area can pose an asphyxiation risk;
- LNG that is spilled does not dissolve in water, nor does it harm aquatic organisms or affect water quality;
- LNG is classified as a cryogenic liquid. Cryogenic liquids are gases that have been converted to liquid state via cooling;
- LNG is non-combustible. To burn, it must first vaporise and then mix with the air in a proportion within its flammable range (between 5 and 15%). The resulting vapour cloud will only combust if there is an ignition source within its flammable range. LNG can only create an explosion if the vented gas is allowed to build up in a closed space.

Exposed parts of the skins need to be covered to reduce the risk of cryogenic burns or frostbite symptoms due to accidental contact with LNG conduits or cold surfaces.



*Cryogenic burns*

**Please note:** An LNG delivery lasts approximately 60 to 90 minutes. When LNG is unloaded at the station, you can often see condensation vapour, which comes from the evaporator under the delivery truck's semitrailer. This vapour should not be mistaken for spilled LNG.



*2.2 Vapour clouds during an LNG delivery*



### PLEASE NOTE

**LNG is a cryogenic liquid that is stored at a temperature of approximately -160 °C. This means that the nozzle, the pipelines at the filling station and the exposed pipelines of the vehicle's LNG tank can be very cold. Direct contact with these surfaces or the LNG itself can lead to severe burns or frostbite symptoms.**



### PLEASE NOTE

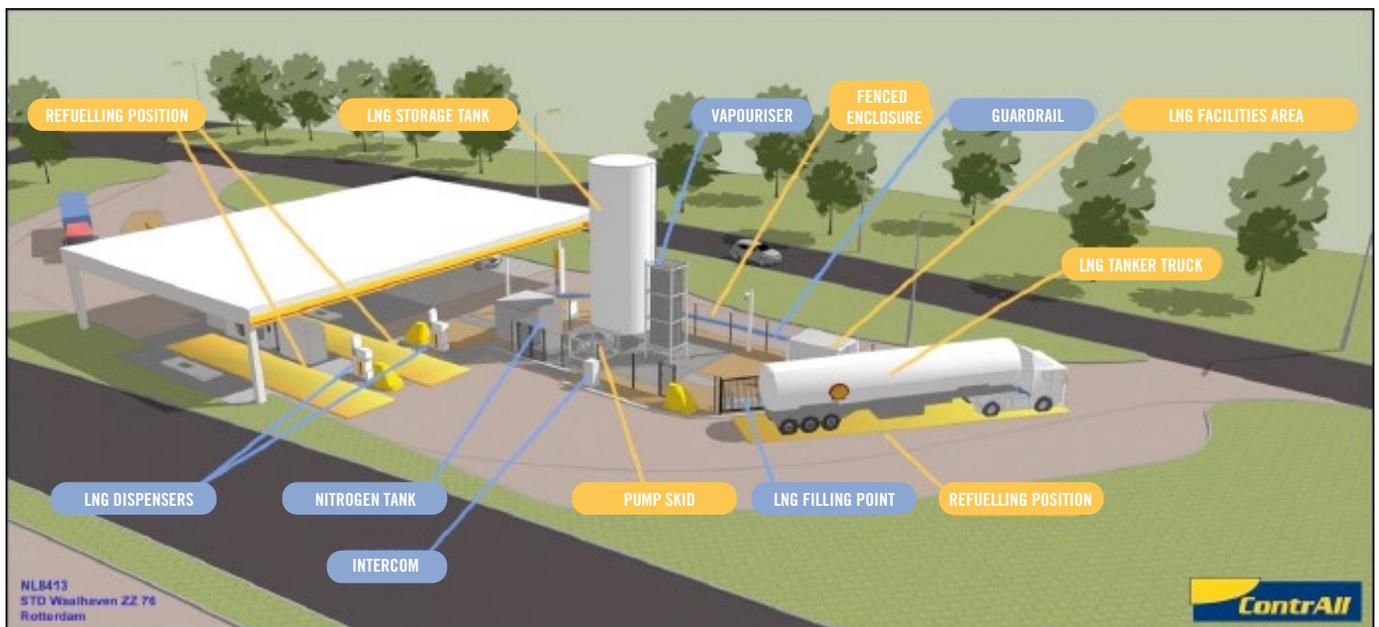
**At some filling stations, the dispenser is not available for filling up on LNG for a maximum of 30 minutes after the LNG has been delivered to the facility. This is due to the fact that the station has to ensure that the newly-delivered LNG has the right temperature and pressure.**

### 3. Layout of filling stations

The following image illustrates the general layout of an LNG filling station. The layout of the actual stations may differ from facility to facility. LNG filling stations are easily recognised by the tall cylindrical storage tanks located within a fenced enclosure.

Only drivers who are in possession an LNG fuel car and who have successfully rounded off the LNG instructions process are allowed to operate the LNG dispensers.

Parking is prohibited at the locations with the exception of the designated parking areas.



*Basic elements of an LNG filling station*

## 4. Refuelling procedure

Although refuelling LNG takes more or less the same time as filling up on diesel fuel, there are a number of differences between the two procedures, so that it is necessary to take a few extra steps and additional precautionary measures.

**When arriving at the station, be sure to check where the emergency stop, intercom, fire extinguishers and emergency assembly area are. Please read all information panels and instructions.**



### PLEASE NOTE

**When first filling up on LNG – in the case of a new truck, for example – we recommend that you initially fill the tank with no more than 6 kg of LNG, after which you should drive the vehicle around for 10 to 15 minutes to allow the LNG tank to cool off and to reduce the local pressure in the tank to less than 10 barg/150 psi. After this, you can complete the steps of the regular refuelling procedure. This may take considerably more time than the regular procedure, and we recommend that you allow someone who has been especially trained for this procedure to do it for you.**

### 4.1 Refuelling procedure

How to operate the dispenser may vary from station to station. This chapter sets out the general safety instructions for this activity. Where required, you may be provided with specific operating instructions at the location itself.

Regardless of which LNG filling station you refuel at, you will always be required to wear the following personal protective equipment:

- Safety goggles/face shield;
- Cryogenic gloves;
- Long sleeves;
- Full-length trousers;
- Sturdy shoes that cover the entire foot.

Wearing these items is necessary to protect yourself against the extremely low temperature levels of LNG as explained in Chapter 2.

- 1 Park your vehicle, ensuring that the LNG tank connection point is directly above the transverse line. Turn off the engine and put on the parking brake.
- 2 Check whether the dispenser is available for refuelling. This is usually indicated by a specific signal or notification message on the dispenser's display.  
If the dispenser is not available at this time – because the station recently received a new LNG delivery, for example, or a technical malfunction – this is indicated by a signal. When in doubt, please get in touch with the station management via the intercom.

**PLEASE NOTE:** Depending on which station you are visiting, you may be required to start with Step 5 first (insert your fuel card in the payment terminal) before being allowed to connect the fuel lines. The appropriate order will be indicated at the filling station in question. For the other filling stations, please proceed to Step 3.

- 3 Where present, connect the dispenser's grounding cable to the earth ground of the LNG tank. If the LNG tank does not have a dedicated earth ground, connect the grounding cable to an unpainted metal surface on the tank's suspension system.



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- 4 Check the pressure in the vehicle's LNG tank. Depending on the station that you are refuelling at, the pressure in the vehicle's LNG tank may need to be reduced to 10 bar before you are allowed to refuel. This will also be indicated on the screen of the dispenser. Once the pressure is correct, please proceed to Step 5.



Where required, at a Shell filling station, you can use the following procedure to reduce the pressure in your vehicle's LNG tank:

- a. Clean the vapour return hose and the vapour return connection point on the tank with the provided air blow gun.
- b. Attach the vapour return hose to the connection point.

At the other filling stations, you will first be required to complete Step 5 (insert your fuel card in the payment terminal) before being allowed to connect the fuel lines.



## PLEASE NOTE

If the vapour return hose and/or the vapour return connection point have not been cleaned correctly, they may occasionally freeze together. They will free up again after some time. Where required, you can choose to speed things up with an air blow gun or water. Do not attempt to force free the vapour return hose, since this can loosen the LNG tank's connection point, releasing the contents of the tank.

Once the vapour return connection starts coming loose, we recommend that you close the shut-off valve of the LNG tank before disconnecting the vapour return hose. This will prevent LNG from being released should the LNG tank's connection point accidentally come loose. You can open the shut-off valve again after you have disconnected the vapour return hose.



## WARNING

Releasing gas into the atmosphere is unacceptable and will not be permitted at any LNG location.

- 5 Initiate the transaction at the payment terminal.



## PLEASE NOTE

Once the transaction has started (i.e. as soon as the payment terminal has accepted your PIN code), you will only have limited time to start refuelling (by pressing the appropriate button). If no further action is taken after initiating a transaction, this transaction will automatically be cancelled after some time.

- 6 Remove the LNG tank cap and clean the LNG tank connection point with the aid of an air blow gun. Remove the nozzle from its holder and make sure it is not damaged in any way.



## WARNING

**NEVER use water to clean the nozzle or the LNG tank connection point!**

- 7 Connect the nozzle to the vehicle's LNG tank and slowly push the levers towards the vehicle, or turn the coupler on the connection point until it locks into place. Gently pull on the nozzle to check if it is securely connected.



## PLEASE NOTE

**Do not apply TOO MUCH FORCE to the nozzle and do not move it to and fro. You should definitely not use any tools or other devices to fasten or unfasten the nozzle. This can seriously damage both the nozzle and the vehicle's LNG tank.**

**You should continue pressing the button of the dead man's switch throughout the entire refuelling procedure. If you release the button, the procedure is automatically stopped after a few seconds.**

8 The pump automatically stops once you have filled your tank to capacity. Refuelling can also be stopped or interrupted for one of the following reasons:

- The dead man's switch has been released;
  - our LNG tank is full;
  - One of the station's safety systems has been put into operation;
  - Someone has pressed the emergency stop.
- Do not repeat the procedure if your fuel tank is full. This may damage your fuel tank.

9 Calmly disconnect the nozzle in a smooth movement by pulling back both levers simultaneously or turning the coupler loose, depending on the system that is used.



## PLEASE NOTE

**If you are driving a dual fuel truck (LNG/diesel or LNG/ CNG), or if the truck is towed into the filling station, there is a risk that your vehicle has a 'warm tank'. This can interrupt the refuelling procedure before the tank is filled to capacity. If this occurs, please complete the steps of the procedure for filling an LNG tank the first time, as set out at the beginning of this chapter.**

10 Carefully dry the nozzle with compressed air.

11 Place the nozzle back in its holder.

12 Clean the connection point of the LNG tank with compressed air and replace the fuel tank cap.



13 Unfasten the grounding cable and return it to the correct holder in the dispenser housing.

14 Return to the payment terminal and complete the transaction.



The transaction has been completed. The dispenser display indicates the total transaction amount and the volume of LNG supplied in kilogrammes.

Before starting your vehicle, be sure to check that:

- All lines, hoses and the grounding cable have been disconnected and correctly stored in their respective holders.
- The fuel tank cap has been put back on correctly.
- The vehicle and the LNG system do not show any leakages of LNG.

## 4.2 Troubleshooting

If you run into any problems during refuelling, please contact the station manager via the intercom.

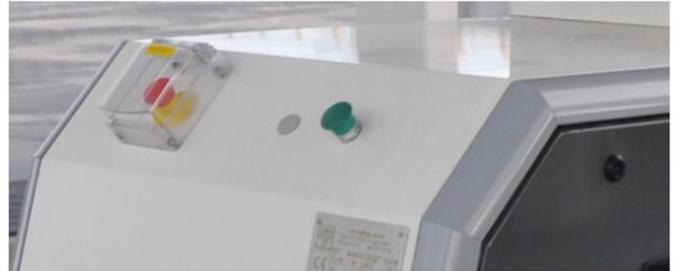


◀ ▼ Intercom



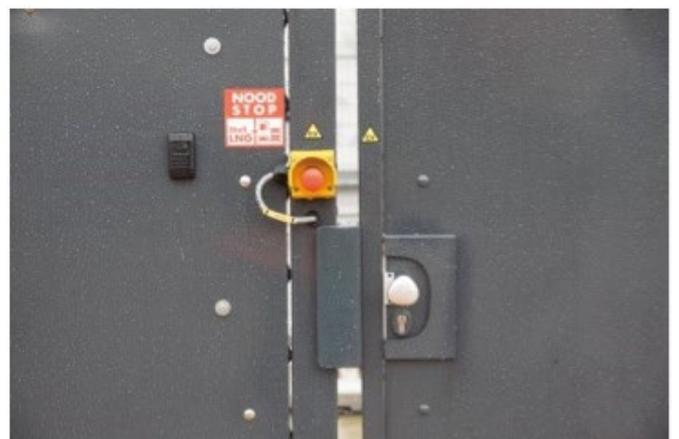
**STOP WARNING**

In the event of a calamity, press the emergency stop, evacuate the area and notify (if it is safe to do so) the station manager via the intercom.



◀ Emergency stop on the dispenser

▼ Emergency stop next to the intercom



# 5 Emergency procedures

Characteristics of a calamity:

- Someone has sustained (serious) injuries and/or
- There is a major LNG leakage and/or
- A fire has broken out.

Characteristics of a technical malfunction:

- The filling station is not functioning as intended and
- The situation is not a calamity.

In the event of a calamity:

1. Press the emergency stop (if this is possible).
2. Warn others in the area (if this possible).
3. Walk to a safe area (assembly area or otherwise).
4. Call the emergency telephone number 112 and/or the Emergency Response Team (Bedrijfshulpverlening, BHV).
5. Call the service number displayed on the information panel.

## 5.1 Risks associated with LNG

- Highly flammable in its gaseous state
- Very low temperatures (-162 °C), with the associated risk of cryogenic burn injuries and impact on structural parts (brittleness). Use special protective clothing in situations that could bring you in contact with LNG.
- When released, LNG is heavier than air (keep an eye on drains and sewer systems where LNG may build up).
- Risk of explosions in closed spaces (PLEASE NOTE: this includes car parks, workshops, etc.).
- Risk of asphyxiation when exposed to high concentrations (move the victim to an area with fresh air and perform resuscitation).
- LNG that has warmed up can no longer be seen with the naked eye (it is no longer visible as a cloud of white vapour).

## 5.2 Safety precautions

- Keep upwind (take account of sloping sites) and DO NOT allow your skin to come in contact with the liquid/vapour cloud.
- Only use mobile phones, walkie-talkies, beepers, etc. in safe areas.

## 5.3 Characteristics of LNG incidents

- Take into account that gas may settle in low areas at quite a distance. LNG mixes with the surrounding air as it warms up.
- The extent to which LNG is visible as a vapour cloud depends on the temperature of the LNG and environmental factors like the temperature and humidity of the surrounding air. A visible vapour cloud does not necessarily have to contain LNG – it can also be condensation!
- LNG is odourless and colourless (it is visible thanks to the white mist created by the condensation of the surrounding air (water vapour)).

## 5.4 Course of action during an LNG incident

- Alert the operator or owner of the vehicle/filling station.
- Alert bystanders and evacuate the area within a large radius of the incident location (100 metres).
- Pay attention to possible ignition sources in the area (e.g. cars).
- Do not attempt to extinguish an LNG fire.
- Treat skin damage due to contact with LNG like a regular burn.

## 5.5 Spills/emissions

In the event that LNG is accidentally spilled or released into the atmosphere:

1. An alarm may sound at the filling station if a certain quantity of LNG is accidentally released. The emergency procedures at the station will automatically be activated. If you think this does not happen quickly enough, you can press the emergency stop yourself.
2. Do **NOT** move or start any vehicles during the incident.
3. Alert everyone in the direct vicinity about the possible danger and ask them to keep their distance.
4. Alert the station manager via the intercom. If you are unable to safely access the intercom, call the emergency telephone number 112 from a safe location.
5. Evacuate everyone in the direct vicinity of the incident location and try to also keep others away from the hazard.
6. Always walk away from the station against the wind or at a 90-degree angle to the wind.

## 5.6 Small- and large-scale fires

In the event of a fire that involves LNG:

1. An alarm will sound in the event of a fire at the filling station. All emergency procedures at the station will automatically be activated. If you think this does not happen quickly enough, you can press the emergency stop yourself.
2. Do **NOT** move or start any vehicles during the incident.
3. Alert everyone in the direct vicinity about the possible danger and ask them to keep their distance.
4. Alert the station manager via the intercom. Your alert will automatically be forwarded to the emergency services. If you are unable to safely access the intercom, call the emergency telephone number 112 from a safe location.
5. Evacuate everyone in the direct vicinity of the incident location and try also to keep others away from the hazard.
6. Always walk away from the station against the wind or at a 90-degree angle to the wind.



### IMPORTANT

- LNG evaporates and creates a vapour cloud. White vapour clouds indicate extremely low temperatures and consist of water vapour and natural gas.
- Gas clouds are heavier than air immediately after being released in the atmosphere. However, they will start to move upwards and evaporate as they warm up.



### PLEASE NOTE

- You should **ONLY** try to extinguish an LNG fire if you have been trained to do so, and if this is necessary to direct prevent personal injury or death.
- **ONLY USE** dry powder fire extinguishers types B or C.
- **NEVER USE** water to extinguish an LNG fire.



### PLEASE NOTE

As a gas, LNG displaces oxygen, leading to the risk of asphyxiation in closed spaces or lower-lying areas where the gas can collect. Be sure to keep your distance.

## 5.7 First aid measures

**Inhalation:** If the victim is having respiratory problems, move the victim away from the source/gas cloud, bring him/her to an area with fresh air and help him/her in a position that allows the victim to breathe easily. If the victim continues to have trouble breathing, he/she needs to be supported with oxygen or artificial respiration by qualified personnel. Immediately seek professional help if the symptoms persist. If the victim's heart has stopped beating, personnel trained to do so should immediately try to resuscitate him/her.

**Contact with the skin:** Cryogenic gases can cause cryogenic burns and injuries. Treat burned or frozen skin by rinsing or submerging the affected area in lukewarm water for at least 15 minutes. Do not rub the affected area. Do not remove any clothing parts that are attached to the skin due to freezing. If the victim starts to feel sensations in the affected tissue again, be sure to keep it warm, dry and clean. If the skin has blistered, these blisters need to be covered with a sterile bandage (or similar dressing). For the remainder, treat the cryogenic burn as you would any normal burn injury and immediately seek professional help.

**Contact with the eyes:** If the victim's eyes have come in contact with LNG, remove possible contact lenses (if this can be done easily), keep the victim's eyes open and calmly rinse the affected eyes with lukewarm water for at least 15 minutes. Immediately seek professional help.

**Ingestion:** It is highly unlikely that this product is ingested, since it is encountered as either a gas or a cryogenic liquid. Should LNG nevertheless be ingested as a cryogenic liquid, in any case prevent the victim from throwing up. The victim is allowed to burp up gas if necessary and possible. Rinse the victim's mouth with cold water and let him/her drink one or two glasses of water or milk.

**Main acute symptoms and effects:** If there are high levels of LNG in the local atmosphere, this may result in asphyxiation. Asphyxiation symptoms include loss of consciousness, and the victim may not actually be aware that he/she is slowly becoming asphyxiated. In low concentrations, LNG in the local atmosphere can cause dizziness, headaches and nausea.



### PLEASE NOTE

**Many materials become brittle after being exposed to refrigerated/cryogenic liquids, so that they may suddenly experience structural failure.**

**If you are uncertain about a particular situation, call the emergency telephone number 112 from a safe location. Contact the station manager immediately afterwards.**

**The manager's contact information is included in the contingency plan found on location.**

## 6. Authorisation and monitoring

After successfully completing the instruction programme and signing a declaration letter with photo ID, the driver will be authorised to refuel LNG. This authorisation is valid for a term of 1 (one) year from its date of issue and may be extended every following year by successfully completing an online instruction programme.

### 6.1 Monitoring

At each of the participating stations, the station manager will regularly perform random inspections to check whether the driver is following the procedures set out in the instructions – either on location or via CCTV, for example. If an infringement of negligence is observed on the basis of these CCTV images, the station manager will send an official warning to the driver's employer.

The participating parties will withdraw the driver's authorisation to refuel LNG at the third warning within the space of a year. In case of a serious infringement or serious negligence, the manager will immediately withdraw the right to refuel LNG. Serious infringements include the following actions (this list should not be considered comprehensive):

- Sharing the driver's personal fuel card with third parties, specifically untrained drivers;
- Wilfully endangering oneself or other people in one's vicinity;
- Wilfully ignoring instructions;
- Smoking or making an open fire at the station site;
- Moving the truck with one or more hoses still attached;
- Defeating the dead man's switch in some way.

The withdrawal of the driver's authorisation on his or her fuel card means that he/she will be required to once again complete the instruction programme. In addition, the manager may decide to issue one or more of the following penalties, depending on the gravity of the offence:

- A damages claim to the amount of at least the full costs of the instruction programme and possible damages as a result of the driver's negligence;
- A temporary suspension of the permission to refuel LNG.

## 7. Your vehicle

You received instructions at the time of your vehicle's delivery. It is important that you can tell emergency personnel where the main components of your vehicle's LNG system, – e.g. shut-off valves and safety vents – are located in the event of an emergency.

A safety vent has been installed on the fuel tank that automatically opens when local pressure in the tank is too high. Pressure may slowly build up in the tank during longer periods of inactivity. Tank pressure will remain below the required level during daily use. If the tank pressure nevertheless increases at a faster pace than intended, you need to notify your vehicle's supplier.