SAFETY DATA SHEET

LIQUEFIED NATURAL GAS

Date : 2015-11-10

No. FDS 001 Version 1.03 Last edition : 2020-08-18

1. Product and Company Identification

Product Name Liquefied Natural Gas

Reference Safety Data Sheet from 2014-07-03

Chemical formula CH_4

Product Type

Product Use(s) Fuel or fuel supply for various processes

Mixture of petroleum hydrocarbons

Synonym(s) LNG, liquid natural gas, natural gas in a liquid state

Manufacturer Gaz Métro GNL s.e.c. ou Gaz Métro GNL 2013 s.e.c.,
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2. Hazards Identification

Product Class

	Category	Code
Flammable gas	1	H220
Gas under pressure	Liquefied gas	H280
Simple Asphyxiant	1	

GHS symbol

Signal word **DANGER - ATTENTION**

Hazard statement H220 : Extremely flammable gas

H280 : Contains gas under pressure; may explode if heated

Precautionary statements

General N.A.

Prevention P202 : Do not handle until all safety precautions have been read and understood.
P210 : Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

Response P377 : Leaking gas fire – do not extinguish unless leak can be stopped safely.
P381 : Eliminate all ignition sources if safe to do so.

Storage P403 : Store in a well ventilated place.

Disposal N.A.

Other Hazards Information Can displaced the oxygen and quickly cause asphyxiation.

3. Composition/information on ingredients

COMPONENTS	CAS #	% (mass)
Methane	74-82-8	98,3
Ethane	74-84-0	1,7

Additional Information Other elementary hydrocarbons may be present as an impurity.

4. First-aid measures

First aid procedures Show this safety data sheet to the emergency personnel and the attending physician.

Eye contact In case of frostbite or freezing, gently rinse eyes with warm water. **DO NOT RINSE THE EYES WITH HOT WATER.**
Keep the eyelids open wide to allow the liquid to evaporate.
If the person cannot tolerate the light, protect eyes with a bandage or handkerchief.
Do not put any ointment in the eyes without medical advice.
Consult a doctor immediately.

Skin contact Remove contaminated clothing and rinse the affected area under warm water.
The exposed area may be warmed, but **DO NOT USE HOT WATER.**
Consult a doctor immediately in the event of frostbite or blisters.

Inhalation Move the victim to the fresh air
If the person is not breathing, call 911 or an ambulance, then administer CPR. If breathing is difficult, give oxygen.
Never try to make an unconscious person drink. Do not leave victims unattended.
Consult a doctor immediately.

Ingestion Rinse mouth and drink water in sips. **DO NOT INDUCE VOMITING.**
Never try to make an unconscious person drink.
Consult a doctor immediately.

Important Symptoms & Health Effects **SIMPLE ASPHYXIANT:** a physiologically inert gas that exerts its action by displacing oxygen from the air. If the percentage by volume of oxygen falls under 19.5%, there is not enough to maintain oxygen saturation in the blood.

Indication of any immediate medical attention and special treatment needed Not applicable

5. Fire-fighting measures

Suitable extinguishing media Do not try to extinguish the fire if the gas leak cannot be stopped.
Dry chemical, powders, high expansion foam, carbon dioxide (CO_2).
Water spray may be used to cool the contents.

Unsuitable extinguishing media Do not use carbon dioxide, low-expansion foam or a strong water spray directly on the liquefied gas.
Using water or any liquid at room temperature directly on the liquefied gas will instantaneously vaporize the gas.

Dangerous Product Specific Hazards The vapours may form a flammable mixture with air, which, in case of ignition, may release an explosive force if in an enclosed space.
Risk of RPT (Rapid Phase Transition): the significant difference in temperature between the LNG and a hotter liquid may cause the "almost instantaneous" vaporization of the LNG. The sudden increase in total volume occupied by the LNG may generate a "cold explosion" shock wave (sudden generation of overpressure but without combustion).

Hazardous Combustion Products Carbon monoxide (CO) , Carbon dioxide (CO_2), fumes

Particular Protective Equipment and Precautions for Firefighters Wear a supplied-air respirator near the leak to avoid any risk of asphyxiation.
Do not try to extinguish the fire if the gas leak cannot be stopped. Intervene at a distance, approaching downwind, if necessary. If needed, use a combustible gas detector (explosimeter).
Establish a security perimeter.
In case of fire, and if it can be done safely, close the gas inlet valve.
The vapours generated during a significant spill of liquefied gas may travel a long way to a distant ignition source and produce a flashback.

The spilled liquid may pool on the ground and flow toward lower points until the cloud temperature rise to more than -100 °C.
Cool the exposed containers with water spray. Help the gas cloud to disperse using a water spray.

6. Accidental release measures

Personal Precautions, Protective Equipment and Emergency Procedures

Activate the Emergency Measures Plan in case of a spill.
Evacuate non-essential personnel and establish a security perimeter.
Suppress or control all ignition sources.
Do not touch the spilled liquid.
Never respond alone to a significant incident.
Use only in well-ventilated areas. See also OSHA regulations regarding the handling of this product, including standard 29 CFR 1910.110: Storage and handling of liquefied petroleum gases.

Environmental precautions

Let the gas escape into the atmosphere.
Do not flush, or allow the LNG to flow, down the drain or into the sewer system. Check if combustible gas is present in the sewers, underground structures and buildings
In case of a bottle leak, close the bottle and return it to the supplier.
In case of significant quantities, consult the regional office of the environmental authority that has jurisdiction.

Methods and materials for containment and cleaning up

Check the condition and characteristics of the container.
Consider the meteorological conditions (wind speed and direction, temperature, humidity).
Stay upwind and, if possible, evaluate the direction taken by the product.
The vapour cloud may be white, but the color dissipates and there is always a risk of fire or explosion.
Use water spray to disperse vapours.
Isolate the area until the gas has dispersed.
Aerate and test the area before entering

7. Handling and storage

Secure Handling Precautions

Use only in well ventilated zones. See also OSHA regulations for the manipulation of this product, including the 29 CFR 1910.110 standard : Storage and handling of liquefied petroleum gases.
Handling must conform to the LSST stipulations and its regulations, such as the RSST (in particular sections VII and X), the RSSM and the CSTC.

Secure Storage Conditions

Keep away from naked flames, sparks and excessive temperatures.
Store only in containers approved for liquid natural gas.
Storage must conform to the LSST stipulations and its regulations, such as the RSST (in particular sections VII and X), the RSSM and the CSTC. According to the situation, the chapter Building of the Safety code and the CNPI can also apply.

Incompatible materials

This product is incompatible with these substances: air, oxygen, strong oxidizing agents, compounds of chlorine or fluorine, and other halides.

8. Exposure controls/personal protection

Control parameters – admissible ROHS value (QC)

NOM CHIMIQUE	# CAS	Type	Valeur	Remarque
Methane	74-82-8			Simple asphyxiant
Ethane	74-84-0			Simple asphyxiant

Other Information None known

Appropriate engineering controls N.A.

Personal protective equipment (PPE)

Eye/face protection Wear eye protection if there is a risk of refrigerated liquefied gas splatters. The choice of eye protection, goggles, face shields, etc., depends on the nature of the work to be done and the risk of exposure. .

Skin and body protection In case of a risk of contact with refrigerated liquefied gas, wear a face shield and waterproof low-temperature-resistant clothing (apron, cryogenic gloves). Flame-retardant clothing may also be worn, depending on the nature of the work and the risk of fire.

Respiratory protection Wear a supplied-air respirator if the gas concentration in working areas is presenting any risk of asphyxiation.
Use a NIOSH / MSHA approved protector with positive air pressure, a respirator with adduction of air or an autonomous respiratory system (ARS) in situations where the content in oxygen atmosphere is deficient or uncertain.
Attention: the limits of flammability should be considered during the evaluation of the necessity of exposing the staff to concentrations requiring a respiratory protection.
Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992 or to NIOSH Respirator Decision Logic, the CSA Z94.4-93standard process to get more advice about the selection of a respiratory protection equipment.

9. Physical and chemical properties

Appearance (form, color)	Liquefied gas (cryogenic fluid) Clear liquid Cold vapour; white cloud	**Vapor pressure**	110 KPa
Odor	Odourless (or very faint odour)	**Vapor density (air = 1)**	0,555
Odor threshold	None	**Density (water=1)**	0,4415 à -162 °C
pH	N.A.	**Solubility (in water)**	soluble
Melting / freezing point	-182.47°C	**Partition coefficient (n-octanol/water)**	0,0812
Initial boiling point and boiling range	-161,5 °C (1 atm)	**Auto-ignition**	580 °C
Flash point	-136 °C (methane)	**Decomposition temperature**	N.A.
Evaporation Rate (ether = 1)	N.A.	**Viscosity**	N.A.
Flammability (solid, gas)	N.A.	**Specific gravity**	N.A.
Upper / lower flammability or explosive	Upper : 15,4% à 25 °C Lower : 5,0% à 25 °C		

10. Chemical Stability and Reactivity Information

Reactivity Keep away from sources of ignition and heat, high temperatures, open flames, sparks, welding, static electricity and other ignition sources. Do not smoke.

Chemical stability Stable under normal conditions of use, storage, and transportation.

Hazardous polymerization Hazardous polymerization does not occur.

Conditions to avoid Gaseous methane, within the flammable or explosive limits, can easily ignite if subject to a sufficiently high-energy electrostatic discharge.

Incompatible materials May burn or explode in a confined space when mixed with strong oxidizing agents (peroxide, chlorine, chlorine dioxide, liquid oxygen)

Dangerous decomposition products CO, CO_2, fumes (combustion)

11. Toxicological Information

Information on the likely routes of exposure

Inhalation and skin contact. Physiologically inert. Ingestion is not likely to happen during normal industrial use.

Health effects associated with ingredients

Inhalation/Skin/Eyes

Tissue damage caused by frostbite on contact with liquefied gas. The vapours are not irritants. However, direct contact of the eyes, skin or mucous membranes with the cold vapours or liquid gas may cause frostbite, burns and permanent ocular and skin lesions.
The signs of frostbite are a change in the colour of the skin to grey or white, followed later by blisters. The skin may become inflamed and painful
The vapours have a narcotic effect. Because of the very rapid rate of evaporation, all the air may be displaced, leading to a risk of asphyxiation
Methane is a simple asphyxiant. Exposure to very high concentrations of methane may induce asphyxiation since it displaces the oxygen in the air.
The principal symptoms associated with asphyxiation are rapid pulse and respiration, headaches, dizziness, visual problems, mental confusion, impaired coordination, mood changes, muscular weakness, trembling, cyanosis, narcosis, numbness of the extremities, unconsciousness leading to a lesion in the central nervous system that may result in death by anoxia
The effects of asphyxiation may be felt more rapidly during physical effort since oxygen consumption is increased.
Even though considered non-toxic by inhalation, exposure to high concentrations of LNG may cause a depression of the nervous system (rapid respiration, dizziness, somnolence, headaches—symptoms similar to those of drug use), but without any long-term effects.
People with pre-existing heart, lung and/or blood conditions may have an increased sensitivity to symptoms of asphyxiation.

Acute Toxicology Data

COMPONENTS	CAS	LD_{50}	LC_{50}
Methane	74-82-8	N.A.	35 355 ppm 4 hours (mouse)
Ethane	74-84-0	N.A.	N.A.

Skin Corrosion/Irritation

This product is not irritating, but may cause frostbite on contact with liquefied gas.

Eye Corrosion/Irritation

Tissue damage caused by frostbite on contact with liquefied gas. The vapours are not irritants. However, direct contact of the eyes, skin or mucous membranes with the cold vapours or liquid gas may cause frostbite, burns and permanent ocular and skin lesions.

Skin/Respiratory Sensitization

No data concerning the respiratory or skin sensitization was found in the consulted documentary sources.

Specific target organ toxicity

No data concerning the effect on the target organs was found in the consulted documentary sources.

Carcinogenicity

No data concerning the carcinogenic effect was found in the consulted documentary sources (OSHA, ACGIH).

Reproductive Effects

No data concerning the reproductive effect was found in the consulted documentary sources.

Germ Cells Mutagenicity

No data concerning the in vivo or in vitro mutagenic effect on germ cells from mammals was found in the consulted documentary sources.

12. Ecological Information

Aquatic Ecotoxicity

Components	CAS	CL_{50}
Methane	74-82-8	N.A.
Ethane	74-84-0	N.A.

Land Ecotoxicity	This material is not harmful to environment.
Persistence and degradability	The product is not persistent in the environment.
Bioaccumulation potential	The product is not bioaccumulating.
Mobility in soil	Not considered mobile.
Other adverse effects	No data available

13. Disposal considerations

Disposal instructions	Let the gas escape into the atmosphere. In case of a bottle leak, close the bottle and return it to the supplier.

14. Transportation Information

UN Identification	UN 1972
Proper shipping name	NATURAL GAS, REFRIGERATED LIQUID (with high methane content)
Class	2.1
Packing group	N.A.
Environmental Hazards	This material is not harmful to aquatic life or environment.
Additional description & information	N.A.

15. Regulatory Information

Applicable Regulations	Product classification and SDS have been elaborated in accordance to DGR. This product has been classified according to the criteria of the DGR and the SDS contains all the information required by the DGR. Act respecting Occupational Health and Safety (AOHS) (CQLR, c. S-2.1) Regulation respecting Occupational Health and Safety (c. S-2.1, r. 19.01) The product is controlled according to WHMIS 2015. In Canada, all ingredients are part of the Domestic Substances List (DSL)

16. Other information

Prepared by	Envirospec for Energir www.envirospec.qc.ca
SDS history	First edition 2015-11-10 (French)
SDS status	*Active*
Other information	The information in this data sheet was written based on the best knowledge and the best experience currently available.
Références	**ACGIH**. *Guide to Occupational Exposure Values 2012*, Compiled by the American Conference of Governmental Industrial Hygienists (ACGIH) **CANUTEC** **CSST**. *Service du répertoire toxicologique*. **GOUVERNEMENT DU QUÉBEC**. *Règlement sur la santé et la sécurité du travail* (c.S-2.1, r.19.01) Update August 1st 2015 **ROBERT R**, Lauwerys (2003). *Toxicologie industrielle et intoxications professionnelles*. 5eédition. Masson, 1252 pp. **Transport Canada,** *Règlement sur le transport des marchandises dangereuses (RTMD)*

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES (2005). *NIOSH Pocket Guide to Chemical Hazards*. NIOSH Publications, 424 pp.

U.S. NATIONAL FIRE PROTECTION ASSOCIATION. *Standards*
NFPA 77, Standard for Static Electricity
NFPA 68, Standard on Explosion Protection by Deflagration Venting
NFPA 69, Standard on Explosion Prevention Systems

Acronyms

ACGIH: American Conference of Governmental Industrial Hygienists
AICS: Australian Inventory of Chemical Substances
CAS: Chemical Abstract Services
CNPI : National Fire Code of Canada
CPR : Cardiopulmonary resuscitation
CSA: Canadian Standardization Association
CSST: Commission de la santé et sécurité du travail (Occupational Health and Safety Commission, Quebec)
CSTC: Safety Code for the Construction Industry
DGR: Dangerous Good Regulation
DSL: Domestic Substances List (Canada)
ECL: Existing Chemicals List
GHS: Globally Harmonised System of Classification and Labelling of Chemicals
IARC: International Agency for Research on Cancer
LC: Lethal Concentration
LD: Lethal Dose
N.A. : Not Applicable / Not Available
NFPA: National Fire Protection Association
NIOSH: National Institute for Occupational Safety and Health
NTP: National Toxicology Program
OEL: Occupational Exposure Limit
ONU: Organisation des Nations Unies
OSHA: Occupational Safety and Health Administration
QC: Quebec Province, Canada
REPTOX : CSST Toxicological Directory
ROHS : Regulation respecting Occupational Health and Safety
RPC: Chemical Products Regulation
RSSM: Health and Security Regulation for Mine Industry
RTMD: Transportation of Dangerous Goods Regulations
SDS: Safety Data Sheet
STEL: Short Term Exposure Limit
TSCA: Toxic Substances Control Act
TWA: Time Weighted Average
WHMIS: Workplace Hazardous Materials Information System