



MATERIAL SAFETY DATA SHEET

LIQUID NITROGEN

DATE: April 2001

1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT IDENTIFICATION

Product Name	LIQUID NITROGEN CRYOGENIC NITROGEN
Chemical Formula	N ₂
Trade Names	Liquid Nitrogen Cryogenic Nitrogen
Visual Identification	The Portable Cryogenic Container (PCC) is made of polished stainless steel, and has the relevant decal affixed to the body of the PCC to clearly identify the contents. There is also a permanent tag fitted to the PCC for traffic ID purposes.
Valve	The vapour outlet is Brass ¾ inch BSP right hand female.
Company Identification	Les Gaz Industriels Ltd Pailles Road G.R.N.W. – Republic of Mauritius Tel. No: (+230) 212 8306 Fax No: (+230) 212 0235

2 COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	Nitrogen
Chemical Family	Inert gas
CAS No.	7727-37-9
UN No.	1977
ERG No.	120
Hazchem Warning	2 C Non-flammable gas

3 HAZARDS IDENTIFICATION

Main Hazards All Portable Cryogenic Containers (PCC's) containing cryogenic liquids must be regarded as pressure vessels at all times. Excessive exposure to heat could cause the internal pressure to increase significantly with the consequent violent rupturing of the vessel. Due to its extremely low boiling point, -196°C, extreme care must be taken when handling liquid nitrogen, otherwise frostbite can occur. Nitrogen does not support life. It can act as a simple asphyxiant by diluting the concentration of oxygen in air below the levels necessary to support life.

Adverse Health effects. Inhalation of nitrogen in excessive concentrations can result in dizziness, nausea, vomiting, loss of consciousness and death.

Chemical Hazards At the temperature of liquid nitrogen, ordinary carbon steels, and most alloy steels, lose their ductility, and are therefore considered to be unsatisfactory. Metals and alloys that have satisfactory ductility include austenitic stainless steel (i.e. types 204 and 216), and nickel-chromium alloys, nickel, Monel 400, copper, brasses, bronze and aluminium. Nitrogen is relatively inert to most materials under ordinary conditions. It becomes more reactive at elevated temperatures, and combines with hydrogen, oxygen and some metals.

Biological Hazards Contact between the skin and liquid nitrogen or uninsulated piping or vessels containing it, can cause severe cold burn injuries.

Vapour Inhalation As nitrogen acts as a simple asphyxiant death may result from errors in judgement, confusion, or loss of consciousness which prevents self-rescue. At low oxygen concentrations, unconsciousness and death may occur in seconds without warning.

Eye Contact Can cause severe burn-like injuries.

Skin Contact Frostbite can occur from contact with liquid nitrogen.

Ingestion Severe burn-like injuries would occur.

4 FIRST AID MEASURES

Prompt medical attention is mandatory in all cases of overexposure to Nitrogen. Rescue personnel should be equipped with self-contained breathing apparatus. In case of frostbite from contact with liquid nitrogen place the frost-bitten part in warm water, about 40 - 42°C. If warm water is not available, or is impractical to use, wrap the affected part gently in blankets. Encourage the patient to exercise the affected part whilst it is being warmed. Do not remove clothing whilst frosted. Conscious persons should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. Unconscious persons should be removed to an uncontaminated area, and given mouth-to-mouth resuscitation and supplemental oxygen.

Eye Contact Immediately flush with large quantities of tepid water, or with sterile saline solution. Seek medical attention.

Skin Contact See above for handling of frostbite.

Ingestion Allow damaged areas to warm gently. Seek medical attention.

5 FIRE FIGHTING MEASURES

Extinguishing media As Nitrogen is an inert gas, it does not contribute to a fire, but could help with the extinguishing by reducing the oxygen content of the air by dilution to below the level to support combustion.

Specific Hazards Nitrogen does not support life. It can act as a simple asphyxiant by diluting the concentration of oxygen in the air below the levels to support life.

Emergency Actions If possible, shut off the source of escaping nitrogen. Evacuate area. Prevent liquid nitrogen from entering sewers, basements and workpits. Keep the PCC, bulk tank or tanker cool by spraying with water if exposed to a fire. If tanker has overturned, do not attempt to right or move it. CONTACT THE NEAREST AFROX BRANCH.

Protective Clothing Self-contained breathing apparatus. Safety gloves and shoes, or boots, should be worn when handling containers.

Environmental precautions. Nitrogen is lighter than air and disperses rapidly in the atmosphere. Care should be taken when entering a potentially oxygen-deficient environment. If possible, ventilate the affected area.

6 ACCIDENTAL RELEASE MEASURES

Personal Precautions Do not enter any area where nitrogen has been spilled unless tests have shown that it is safe to do so.

Environmental Precautions Nitrogen itself does not pose a hazard to the environment. However, because of the extreme cold of the liquid, damage to the ecology can occur in the immediate environs of the spill.

Small spills. Shut off the source of escaping nitrogen. Ventilate the area.

Large spills. Evacuate the area. Shut off the source of the spill if this can be done without risk. Restrict access to the area until completion of the clean-up procedure. Ventilate the area using forced-draught if necessary.

7 HANDLING AND STORAGE

When liquid nitrogen is held in any closed vessel or space, there must be an appropriate pressure relief device because of the very large pressure increases that can occur as the liquid nitrogen is vapourised. Liquid nitrogen must also be handled with all the precautions required for safety with any cryogenic fluid. Keep out of reach of children.

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

Occupational Exposure Hazards As nitrogen is a simple asphyxiant, avoid any areas where spillage has taken place. Only enter once testing has proved the atmosphere to be safe.

Engineering control measures. Engineering control measures are preferred to reduce exposure to Oxygen-depleted atmospheres. General methods include forced-draught ventilation, separate from other exhaust ventilation systems. Ensure that sufficient fresh air enters at, or near, floor level.

Personal protection Self-contained breathing apparatus should always be worn when entering area where oxygen depletion may have occurred. Safety goggles, gloves and shoes, or boots, should be worn when handling containers.

Skin. Wear loose-fitting overalls, preferably without pockets.

9 PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL DATA

Chemical Symbol	N ₂
Molecular Weight	28,01
Boiling point @ 101,325 kPa	-195,8°C
Density, liquid @ boiling point	803,6 kg/m ³
Relative density (Air = 1) @ 101,325 kPa	0,967
Latent heat of vapourisation @ boiling point	199,1 kJ/kg
Colour	None
Taste	None
Odour	None

10 STABILITY AND REACTIVITY

Conditions to avoid The dilution of the oxygen concentration in the atmosphere to levels which cannot support life.

Incompatible Materials At the temperature of liquid nitrogen ordinary carbon steels, and most alloy steels lose their ductility, and are therefore considered to be unsatisfactory. Metals and alloys that have satisfactory ductility include austenitic stainless steel (i.e. types, 304 and 316), and nickel-chromium alloys, nickel, Monel 400, copper, brasses, bronze and aluminium.

Hazardous Decomposition Products - None

11 TOXICOLOGICAL INFORMATION

Acute Toxicity No known effect.
Skin & eye contact No known effect.
Carcinogenicity Severe cold burns could result in carcinoma.

Reproductive Hazards No known effect
For further information see Section 3. Adverse Health Effects).

12 ECOLOGICAL INFORMATION

It does not pose a hazard to the ecology.

13 DISPOSAL CONSIDERATIONS

Disposal Methods Small amounts may be allowed to evaporate to atmosphere under controlled conditions. Large amounts should only be handled by the gas supplier.

Disposal of packaging The disposal of cylinders must only be handled by the gas supplier.

14 TRANSPORT INFORMATION

ROAD TRANSPORTATION

UN No. 1977
ERG No. 120
Hazchem warning 2C Non-flammable gas

SEA TRANSPORTATION

IMDG 1977
Class
Packaging group
Label Non-flammable gas

AIR TRANSPORTATION

ICAO/IATA Code 1977
Class 2.2
Packaging group
Packaging instructions
- Cargo 202
- Passenger 202
Maximum quantity allowed
- Cargo 500 kg
- Passenger 50 kg

15 REGULATORY INFORMATION

EEC Hazard class Non-flammable
Risk phrases R35 Causes severe burns
R41 Risk of serious damage to eyes
R44 Risk of explosion if heated under confinement
R45 May cause cancer
Safety phrases S2 Keep out of reach of children
S9 Keep container in a well-ventilated place
S12 Do not keep the container sealed
S15 Keep away from heat
S36 Wear suitable protective clothing
S51 Use only in well-ventilated areas
National legislation None
Refer to SABS 0265 for explanation of the above.

16 OTHER INFORMATION

Bibliography
Compressed Gas Association, Arlington, Virginia
Handbook of Compressed Gases - 3rd Edition
Matheson. Matheson Gas Data Book - 6th Edition
SABS 0265 - Labelling of Dangerous Substances

17 EXCLUSION OF LIABILITY

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