1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: NITROGEN, REFRIGERATED LIQUID
Product Code(s): G-103
UN-No: UN1977
Recommended Use: Industrial use.
Synonyms: Nitrogen, liquid

Supplier Address:
Linde Gas North America LLC - Linde Merchant Production Inc. - Linde LLC
575 Mountain Ave.
Murray Hill, NJ 07974
Phone: 908-464-8100
www.lindeus.com

Linde Gas Puerto Rico, Inc.
Las Palmas Village
Road No. 869, Street No. 7
Catano, Puerto Rico 00962
Phone: 787-641-7445
www.pr.lindegas.com

Linde Canada Limited
5860 Chedworth Way
Mississauga, Ontario L5R 0A2
Phone: 905-501-1700
www.lindecanada.com

* May include subsidiaries or affiliate companies/divisions.

For additional product information contact your local customer service.

Chemical Emergency Phone Number
Chemtrec: 1-800-424-9300 for US/ 703-527-3887 outside US

2. HAZARDS IDENTIFICATION

WARNING!

Emergency Overview
Extremely cold liquid and gas under pressure.
Simple asphyxiant
Contact with product may cause frostbite
Contents under pressure
Keep at temperatures below 52°C / 125°F

Appearance: Colorless
Physical State: Cryogenic Liquid.
Odor: Odorless

OSHA Regulatory Status
This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
**Potential Health Effects**

**Principle Routes of Exposure**  Inhalation. Skin contact.

**Acute Toxicity**

**Inhalation**  Simple asphyxiants. May cause suffocation by displacing the oxygen in the air. Exposure to oxygen-deficient atmospheres (<19.5%) may cause dizziness, drowsiness, nausea, vomiting, excess salivation, diminished mental alertness, loss of consciousness and death. Exposure to atmospheres containing 8-10% or less oxygen will bring about unconsciousness without warning and so quickly that the individuals cannot help or protect themselves. Lack of sufficient oxygen may cause serious injury or death.

**Eyes**  This product is a gas at room temperature. Contact with liquid may cause frostbite.

**Skin**  This product is a gas at room temperature. Contact with liquid may cause frostbite.

**Skin Absorption Hazard**  No known hazard in contact with skin.

**Ingestion**  Not an expected route of exposure.

**Chronic Effects**  None known.

**Aggravated Medical Conditions**  None known.

**Environmental Hazard**  See Section 12 for additional Ecological Information.

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### 3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS-No</th>
<th>Volume %</th>
<th>Chemical Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen</td>
<td>7727-37-9</td>
<td>&gt;99</td>
<td>N₂</td>
</tr>
</tbody>
</table>

### 4. FIRST AID MEASURES

**Eye Contact**  None required for gas. If frostbite is suspected, flush eyes with cool water for 15 minutes and obtain immediate medical attention.

**Skin Contact**  None required for gas. For dermal contact or suspected frostbite, remove contaminated clothing and flush affected areas with lukewarm water. DO NOT USE HOT WATER. A physician should see the patient promptly if contact with the product has resulted in blistering of the dermal surface or in deep tissue freezing.

**Inhalation**  PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF INHALATION OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Conscious inhalation victims should be assisted to an uncontaminated area and inhale fresh air. If breathing is difficult, administer oxygen. Unconscious persons should be moved to an uncontaminated area and, as necessary, given artificial resuscitation and supplemental oxygen. Treatment should be symptomatic and supportive.

**Ingestion**  None under normal use. Get medical attention if symptoms occur.

**Notes to Physician**  Treat symptomatically.
5. FIRE-FIGHTING MEASURES

**Flammable Properties**
Not flammable.

**Suitable Extinguishing Media**
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

**Explosion Data**
- **Sensitivity to Mechanical Impact**: None
- **Sensitivity to Static Discharge**: None
- **Specific Hazards Arising from the Chemical**: Cylinders may rupture under extreme heat. Continue to cool fire exposed cylinders until flames are extinguished. Damaged cylinders should be handled only by specialists.

**Protective Equipment and Precautions for Firefighters**
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

**Personal Precautions**
Ensure adequate ventilation. Evacuate personnel to safe areas. Use personal protective equipment. Monitor oxygen level.

**Environmental Precautions**
Prevent spreading of vapors through sewers, ventilation systems and confined areas.

**Methods for Containment**
Stop the flow of gas or remove cylinder to outdoor location if this can be done without risk. If leak is in container or container valve, contact the appropriate emergency telephone number in Section 1 or call your closest Linde location.

**Methods for Cleaning Up**
Return cylinder to Linde or an authorized distributor.

7. HANDLING AND STORAGE

**Handling**
Liquid nitrogen is delivered into stationary vacuum jacketed vessels at the customer’s location or in portable vacuum-jacketed "liquid" cylinders requiring special handling methods. Consult manufacturer’s instructions.

Due to the extremely cold liquid, uninsulated transfer may condense air. The liquefied air may flash off nitrogen, leaving an oxygen enriched liquid. Do not allow the liquefied air to contact oils, grease, or other combustible materials such as asphalt or motor oil. Vessels for liquid nitrogen are designed specifically for nitrogen service. Vessels and associated structures are not designed to support higher density fluids. Density, liquid at saturation pressure at 2.17°K (-271°C): 0.146 Kg/l.
Never allow any unprotected part of the body to touch uninsulated pipes or vessels that contain cold fluids. The extremely cold metal will cause moist flesh to stick fast and tear when one attempts to withdraw from it.

Never attempt to lift a cylinder by its valve protection cap. Protect cylinders from physical damage; do not drag, roll, slide or drop. When moving cylinders, even for short distance, use a cart designed to transport cylinders. Use backflow preventive device in piping. Never insert an object (e.g. wrench, screwdriver, pry bar, etc.) into valve cap openings. Doing so may damage valve, causing leak to occur. If user experiences any difficulty operating cylinder valve discontinue use and contact supplier.

Never put cylinders into trunks of cars or unventilated areas of passenger vehicles. Never attempt to refill a compressed gas cylinder without the owner’s written consent. Never strike an arc on a compressed gas cylinder or make a cylinder a part of an electrical circuit.

For additional recommendations, consult Compressed Gas Association’s Pamphlets, AV-8, CGA-341, G-10.1, P-1, P-9, P-12, P-14, and P-18.

Storage

Protect from physical damage. Cylinders should be stored upright with valve protection cap in place and firmly secured to prevent falling. Store in cool, dry, well-ventilated area of non-combustible construction away from heavily trafficked areas and emergency exits. Keep at temperatures below 52°C / 125°F. Full and empty cylinders should be segregated. Use a “first in-first out” inventory system to prevent full cylinders from being stored for excessive periods of time. Always store and handle compressed gas cylinders in accordance with Compressed Gas Association, pamphlet CGA-P1, Safe Handling of Compressed Gases in Containers.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

This product does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

Engineering Measures

Showers. Eyewash stations. Ventilation systems. Local exhaust ventilation to prevent accumulation of high concentrations and maintain air-oxygen levels at or above 19.5%.

Ventilation

Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/Face Protection

Wear protective eyewear (safety glasses). If splashes are likely to occur, wear: Goggles. Face-shield.

Skin and Body Protection

Wear cold insulating gloves when handling liquid. Work gloves and safety shoes are recommended when handling cylinders.

Respiratory Protection

General Use

No special protective equipment required.

Emergency Use

Use positive pressure airline respirator with escape cylinder or self contained breathing apparatus for oxygen-deficient atmospheres (<19.5%).

Hygiene Measures

Wear suitable gloves and eye/face protection.
9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Colorless</td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>No information available</td>
</tr>
<tr>
<td>Flash Point</td>
<td>No information available</td>
</tr>
<tr>
<td>Decomposition Temperature</td>
<td>No information available</td>
</tr>
<tr>
<td>Freezing Point</td>
<td>-209.9°C / -345.9°F</td>
</tr>
<tr>
<td>Water Solubility</td>
<td>Very slight</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>Above critical temp.</td>
</tr>
<tr>
<td>Gas Density</td>
<td>0.072 lb/ft³ (1.153 kg/m³) (@ 21.1°C)</td>
</tr>
<tr>
<td>Specific Vol. @ 21.1°C &amp; 1 atm</td>
<td>13.8 ft³/lb (0.867 m³/kg)</td>
</tr>
<tr>
<td>Critical Pressure</td>
<td>492.9 psia (3399 kPa abs)</td>
</tr>
<tr>
<td>Odor</td>
<td>Odorless</td>
</tr>
<tr>
<td>Physical State</td>
<td>Cryogenic Liquid</td>
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<tr>
<td>Autoignition Temperature</td>
<td>No information available</td>
</tr>
<tr>
<td>Boiling Point/Range</td>
<td>-195.8°C / -320.4°F</td>
</tr>
<tr>
<td>Molecular Weight</td>
<td>28.01</td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>No information available</td>
</tr>
<tr>
<td>Vapor Density</td>
<td>0.97 (air = 1)</td>
</tr>
<tr>
<td>VOC Content (%)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Decomposition Products</td>
<td>Hazardous polymerization does not occur.</td>
</tr>
</tbody>
</table>

10. STABILITY AND REACTIVITY

- **Stability**: Stable.
- **Incompatible Products**: None known.
- **Conditions to Avoid**: None known.
- **Hazardous Decomposition Products**: None known.
- **Hazardous Polymerization**: Hazardous polymerization does not occur.

11. TOXICOLOGICAL INFORMATION

**Acute Toxicity**

- **LD50 Oral**: No information available.
- **LD50 Dermal**: No information available.
- **LC50 Inhalation**: No information available.
- **Inhalation**: Product is a simple asphyxiant.
- **Repeated Dose Toxicity**: No information available.

**Chronic Toxicity**

- **Chronic Toxicity**: None known.
- **Carcinogenicity**: Contains no ingredient listed as a carcinogen.

**Irritation**: No information available.

**Sensitization**: No information available.

**Reproductive Toxicity**: No information available.
Developmental Toxicity: Oxygen deficiency during pregnancy has produced developmental abnormalities in humans and experimental animals.

Synergistic Materials: None known.

Target Organ Effects: None known.

12. ECOLOGICAL INFORMATION

Ecotoxicity

The environmental impact of this product has not been fully investigated.

Ozone depletion potential; ODP; (R-11 = 1): Does not contain ozone depleting chemical (40 CFR Part 82).

13. DISPOSAL CONSIDERATIONS

Waste Disposal Methods: Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to Linde for proper disposal.

14. TRANSPORT INFORMATION

**DOT**

Proper Shipping Name: Nitrogen, refrigerated liquid
Hazard Class: 2.2
Subsidiary Class: None
UN-No: UN1977
Description: UN1977, Nitrogen, refrigerated liquid, 2.2
Emergency Response Guide Number: 120

**TDG**

Proper Shipping Name: Nitrogen, refrigerated liquid
Hazard Class: 2.2
UN-No: UN1977
Description: UN1977, Nitrogen, refrigerated liquid, 2.2

**MEX**

Proper Shipping Name: Nitrogen, refrigerated liquid
Hazard Class: 2.2
UN-No: UN1977
Description: UN1977, Nitrogen, refrigerated liquid, 2.2

**IATA**

UN-No: UN1977
Proper Shipping Name: Nitrogen, refrigerated liquid
Hazard Class: 2.2
ERG Code: 2L
Description: UN1977, Nitrogen, refrigerated liquid, 2.2
Maximum Quantity for Passenger 50 kg
Maximum Quantity for Cargo Only 500 kg
Limited Quantity No information available.

IMDG/IMO

Proper Shipping Name Nitrogen, refrigerated liquid
Hazard Class 2.2
UN-No UN1977
EmS No. F-C, S-V
Description UN1977, Nitrogen, refrigerated liquid, 2.2

ADR

Proper Shipping Name Nitrogen, refrigerated liquid
Hazard Class 2.2
UN-No UN1977
Classification Code 3A
Description UN1977, Nitrogen, refrigerated liquid, 2.2

15. REGULATORY INFORMATION

International Inventories

TSCA Complies
DSL Complies
EINECS/ELINCS Complies

Legend
TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
EINECS/ELINCS - European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances

U.S. Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

SARA 311/312 Hazard Categories

Acute Health Hazard Yes
Chronic Health Hazard No
Fire Hazard No
Sudden Release of Pressure Hazard Yes
Reactive Hazard No

Clean Water Act
This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

Risk and Process Safety Management Programs
This material, as supplied, does not contain any regulated substances with specified thresholds under 40 CFR Part 68.
This product does not contain any substances regulated as Highly Hazardous Chemicals pursuant to the 29 CFR Part 1910.110.
Clean Air Act, Section 112 Hazardous Air Pollutants (HAPs) (see 40 CFR 61)
This product does not contain any substances regulated as hazardous air pollutants (HAPs) under Section 112 of the Clean Air Act Amendments of 1990.

CERCLA/SARA
This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material.

U.S. State Regulations

California Proposition 65
This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Massachusetts</th>
<th>New Jersey</th>
<th>Pennsylvania</th>
<th>Illinois</th>
<th>Rhode Island</th>
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</thead>
<tbody>
<tr>
<td>Nitrogen</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>X</td>
</tr>
</tbody>
</table>

International Regulations

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Hazard Class
A Compressed gases

16. OTHER INFORMATION

Prepared By  Product Stewardship
23 British American Blvd.
Latham, NY 12110
1-800-572-6501

Issuing Date  05-Mar-2010
Revision Date  01-Sep-2010
Revision Number  1
Revision Note

(M)SDS sections updated. 1.

<table>
<thead>
<tr>
<th>NFPA</th>
<th>Health Hazard</th>
<th>Flammability</th>
<th>Stability</th>
<th>Physical and Chemical Hazards</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>Simple asphyxiant</td>
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<table>
<thead>
<tr>
<th>HMIS</th>
<th>Health Hazard</th>
<th>Flammability</th>
<th>Physical Hazard</th>
<th>Personal Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0</td>
<td>2</td>
<td></td>
<td>-</td>
</tr>
</tbody>
</table>

Note: Ratings were assigned in accordance with Compressed Gas Association (CGA) guidelines as published in CGA Pamphlet P-19-2009, CGA Recommended Hazard Ratings for Compressed Gases, 3rd Edition.

General Disclaimer

For terms and conditions, including limitation of liability, please refer to the purchase agreement in effect between Linde LLC, Linde Merchant Production, Inc. or Linde Gas North America LLC (or any of their affiliates and subsidiaries) and the purchaser.

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End of Safety Data Sheet