1. IDENTIFICATION

**Product identifier**

**Product Name**

Carbon Monoxide (<1%), Methane (<1%), Oxygen (21-23%) In NITROGEN

**Other means of identification**

**Safety data sheet number**

LIND-M0048

**UN/ ID no.**

UN1956

**Trade name**

LUNG DIFFUSION MIXTURE (Methane)

**Recommended use of the chemical and restrictions on use**

**Recommended Use**

Medical, Industrial and professional use.

**Uses advised against**

Consumer use

**Details of the supplier of the safety data sheet**

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.

Road 869, Km 1.8

Barrio Palmas, Catano, PR 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.

**Emergency telephone number**

**Company Phone Number**

800-232-4726 (Linde National Operations Center, US)

905-501-0802 (Canada)

CHEMTREC: 1-800-424-9300 (North America) +1-703-527-3887 (International)
2. HAZARDS IDENTIFICATION

Classification

OSHA Regulatory Status
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200).

<table>
<thead>
<tr>
<th>Reproductive toxicity</th>
<th>Category 1A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gases under pressure</td>
<td>Compressed gas</td>
</tr>
</tbody>
</table>

Label elements

![Label elements image]

Signal word

Danger

Hazard Statements
Contains gas under pressure; may explode if heated
May damage fertility or the unborn child
Supports combustion

Precautionary Statements - Prevention
Do not handle until all safety precautions have been read and understood
Use and store only outdoors or in a well ventilated place
Use a backflow preventive device in piping
Use only equipment of compatible materials of construction and rated for cylinder pressure
Close valve after each use and when empty

Precautionary Statements - Response
IF ACCIDENTLY INHALED: Remove person to fresh air and keep comfortable for breathing. Get medical attention/advice.

Precautionary Statements - Storage
Protect from sunlight when ambient temperature exceeds 52°C/125°F

Hazards not otherwise classified (HNOC)
Not applicable

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>60 - 100</td>
<td>N₂</td>
</tr>
<tr>
<td>Oxygen</td>
<td>7782-44-7</td>
<td>21-23</td>
<td>O₂</td>
</tr>
</tbody>
</table>
Composition covers range of mixtures that fall within the same hazard classifications

### 4. FIRST AID MEASURES

**Description of first aid measures**

**General advice**
Show this safety data sheet to the doctor in attendance.

**Inhalation**
Remove to fresh air and keep comfortable for breathing. If breathing has stopped, give artificial respiration. Get medical attention immediately. If breathing is difficult, give oxygen.

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

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

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

**Self-protection of the first aider**
RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS.

**Most important symptoms and effects, both acute and delayed**

**Symptoms**
High concentrations may cause asphyxia from lack of oxygen or act as a narcotic causing central nervous system depression. Symptoms of overexposure are dizziness, headache, tiredness, nausea, unconsciousness, cessation of breathing. Carbon monoxide is a chemical asphyxiant.

**Indication of any immediate medical attention and special treatment needed**

**Note to physicians**
Treat symptomatically.

### 5. FIRE-FIGHTING MEASURES

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

**Specific extinguishing methods**
Continue to cool fire exposed cylinders until flames are extinguished. Damaged cylinders should be handled only by specialists.

**Specific hazards arising from the chemical**
Non-flammable gas. Supports combustion. Cylinders may rupture under extreme heat.

**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, protective equipment and emergency procedures**

**Personal precautions**
Evacuate personnel to safe areas. Ensure adequate ventilation, especially in confined areas. Monitor oxygen level. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe.

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

Methods and material for containment and cleaning up

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

Precautions for safe handling
Advice on safe handling
Do not use as breathing air. The lung diffusion test mixture contains less than 10,000 ppm carbon monoxide, methane and oxygen content to support life. The balance gas is nitrogen. Lung diffusion test mixtures are used as calibration standards for lung diffusion diagnostic equipment (in-vitro diagnostic aid). The concentration of each component in the mixture in molar percent is shown on the label on the cylinder. DO NOT USE THE PRODUCT IF THE COMPONENT CONCENTRATION DATA IS NOT CLEARLY LEGIBLE ON THE CYLINDER LABEL.

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. Never attempt to lift a cylinder by its valve protection cap. Never insert an object (e.g. wrench, screwdriver, pry bar, etc.) into valve cap openings. Doing so may damage valve, causing leak to occur. Use an adjustable strap wrench to remove over-tight or rusted caps. Use only with adequate ventilation. Use a backflow preventive device in piping. Use only with equipment rated for cylinder pressure. Close valve after each use and when empty. If user experiences any difficulty operating cylinder valve discontinue use and contact supplier. Ensure the complete gas system has been checked for leaks before use.

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.

Only experienced and properly instructed persons should handle gases under pressure. Always store and handle compressed gas cylinders in accordance with Compressed Gas Association, pamphlet CGA-P1, Safe Handling of Compressed Gases in Containers.

Conditions for safe storage, including any incompatibilities

Storage Conditions
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. Cylinders should be stored upright with valve protection cap in place and firmly secured to prevent falling. 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. Stored containers should be periodically checked for general condition and leakage.

Incompatible materials
None known.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters
Exposure Guidelines

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
<th>NIOSH IDLH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methane</td>
<td>TWA: 1000 ppm</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>74-82-8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbon monoxide</td>
<td>TWA: 25 ppm</td>
<td>TWA: 50 ppm</td>
<td>IDLH: 1200 ppm</td>
</tr>
</tbody>
</table>
**Other Information**

Vacated limits revoked by the Court of Appeals decision in AFL-CIO v. OSHA, 965 F.2d 962 (11th Cir., 1992).

**Appropriate engineering controls**

**Engineering Controls**

Local exhaust ventilation to prevent accumulation of high concentrations and maintain air-oxygen levels at or above 19.5%. Oxygen detectors should be used when asphyxiating gases may be released. Systems under pressure should be regularly checked for leakages.

**Individual protection measures, such as personal protective equipment**

**Eye/face protection**

Wear safety glasses with side shields (or goggles).

**Skin and body protection**

Work gloves and safety shoes are recommended when handling cylinders.

**Respiratory protection**

Use positive pressure airline respirator with escape cylinder or self contained breathing apparatus for oxygen-deficient atmospheres (<19.5%). If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.

**General Hygiene Considerations**

Handle in accordance with good industrial hygiene and safety practice.

<table>
<thead>
<tr>
<th><strong>9. PHYSICAL AND CHEMICAL PROPERTIES</strong></th>
</tr>
</thead>
</table>

**Information on basic physical and chemical properties**

**Product Information**

<table>
<thead>
<tr>
<th>Physical state</th>
<th>Compressed gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Colorless</td>
</tr>
<tr>
<td>Odor</td>
<td>Odorless</td>
</tr>
<tr>
<td>Odor threshold</td>
<td>No information available</td>
</tr>
<tr>
<td>pH</td>
<td>No data available</td>
</tr>
<tr>
<td>Melting point</td>
<td>No data available</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Flammability Limit in Air</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Lower flammability limit:</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Upper flammability limit:</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Flash point</td>
<td>No information available</td>
</tr>
<tr>
<td>Autoignition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>Partition coefficient</td>
<td>No data available</td>
</tr>
<tr>
<td>Kinematic viscosity</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

**Component Level Information:**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Molecular weight</th>
<th>Boiling point</th>
<th>Vapor Pressure</th>
<th>Vapor density (air =1)</th>
<th>Gas Density kg/ m³ @ 20°C</th>
<th>Critical Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen</td>
<td>28.01</td>
<td>-196 °C</td>
<td>Above critical temperature</td>
<td>0.97</td>
<td>1.153</td>
<td>-146.9 °C</td>
</tr>
<tr>
<td>Oxygen</td>
<td>31.99</td>
<td>-182.9 °C</td>
<td>Above critical temperature</td>
<td>1.11</td>
<td>1.331</td>
<td>-118.6 °C</td>
</tr>
</tbody>
</table>
10. STABILITY AND REACTIVITY

Reactivity
Not reactive under normal conditions

Chemical stability
Stable under normal conditions.

Explosion data
- Sensitivity to Mechanical Impact: None.
- Sensitivity to Static Discharge: None.

Possibility of Hazardous Reactions
None under normal processing.

Conditions to avoid
None under recommended storage and handling conditions (see Section 7).

Incompatible materials
None known.

Hazardous Decomposition Products
None known.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Inhalation
Carbon monoxide may cause adverse effects on the cardiovascular system and the central nervous system. Carbon monoxide is a chemical asphyxiant.

Skin contact
No data available.

Eye contact
No data available.

Ingestion
Not an expected route of exposure.

Information on toxicological effects

Symptoms
High concentrations may cause asphyxia from lack of oxygen or act as a narcotic causing central nervous system depression. Symptoms of overexposure are dizziness, headache, tiredness, nausea, unconsciousness, cessation of breathing.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation
Not classified.

Sensitization
Not classified.

Germ cell mutagenicity
Genetic changes observed in mammalian cell assay systems at exposures of 1500 to 2500 ppm of carbon monoxide for 10 minutes.

Carcinogenicity
This product does not contain any carcinogens or potential carcinogens listed by OSHA, IARC or NTP.

Reproductive toxicity
Category 1A. Overexposure to carbon monoxide may decrease the likelihood of successful pregnancy. In rats treated with carbon monoxide, the rate of successful pregnancy in the control
group was 100% whereas the rate of successful pregnancy in animals treated with 30 and 90 ppm of carbon monoxide was 69% and 38% respectively.

**Developmental Toxicity**

Mice exposed to concentrations of carbon monoxide at 65 ppm and higher demonstrated dose-dependent effects on the fetus (increased mortality and decreased weight) with no signs of maternal toxicity. Offspring of rats exposed to 150 ppm carbon monoxide had minor reductions in birth weight and persistent memory deficits which became more pronounced in adulthood.

**STOT - single exposure**

Not classified.

**STOT - repeated exposure**

Not classified.

**Chronic toxicity**

Genetic changes observed in mammalian cell assay systems at exposures of 1500 to 2500 ppm carbon monoxide for 10 minutes.

**Target Organ Effects**

Central Vascular System (CVS), Lungs, Blood, Central nervous system (CNS).

**Aspiration hazard**

Not applicable.

**Numerical measures of toxicity**

**Component Level Information:**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Oral LD50</th>
<th>Dermal LD50</th>
<th>Inhalation LC50 (CGA P-20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon monoxide 630-08-0</td>
<td>-</td>
<td>-</td>
<td>3760 ppm (Rat) 1hr</td>
</tr>
</tbody>
</table>

**Product Information**

<table>
<thead>
<tr>
<th>Oral LD50</th>
<th>Dermal LD50</th>
<th>Inhalation LC50</th>
</tr>
</thead>
<tbody>
<tr>
<td>No information available</td>
<td>No information available</td>
<td>No information available</td>
</tr>
</tbody>
</table>

The following values are calculated based on chapter 3.1 of the GHS document.

ATEmix (inhalation-gas) >20,000 ppm

---

### 12. ECOLOGICAL INFORMATION

**Ecotoxicity**

No known acute aquatic toxicity.

**Persistence and degradability**

No information available.

**Bioaccumulation**

No information available.

---

### 13. DISPOSAL CONSIDERATIONS

**Waste treatment 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**

<table>
<thead>
<tr>
<th>UN/ID no.</th>
<th>Proper shipping name</th>
<th>Hazard Class</th>
<th>Description</th>
<th>Emergency Response Guide Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN1956</td>
<td>Compressed gas, n.o.s.</td>
<td>2.2</td>
<td>UN1956, Compressed gas, n.o.s.(Carbon Monoxide, Oxygen)</td>
<td>126</td>
</tr>
</tbody>
</table>

---
LIND-M0048 Carbon Monoxide (<1%), Methane (<1%), Oxygen (21-23%) In NITROGEN

15. REGULATORY INFORMATION

International Inventories

TSCA
Complies

DSL/ NDSL
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 Chemical Substances/ European List of Notified Chemical Substances

US 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
No
Chronic Health Hazard: Yes
Fire Hazard: No
Sudden release of pressure hazard: Yes
Reactive Hazard: No

**CERCLA**
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.

**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.

**CWA (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, contains one or more regulated substances with specified thresholds under 40 CFR Part 68 or regulated as a highly hazardous chemical pursuant to the 29 CFR Part 1910.110 with specified thresholds:

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>U.S. - CAA (Clean Air Act) - Accidental Release Prevention - Toxic Substances</th>
<th>U.S. - CAA (Clean Air Act) - Accidental Release Prevention - Flammable Substances</th>
<th>U.S. - OSHA - Process Safety Management - Highly Hazardous Chemicals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methane</td>
<td></td>
<td></td>
<td>10000 lb</td>
</tr>
</tbody>
</table>

**US State Regulations**

**California Proposition 65**
This product contains the following Proposition 65 chemicals

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>California Proposition 65</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon monoxide - 630-08-0</td>
<td>Developmental</td>
</tr>
</tbody>
</table>

**U.S. State Right-to-Know Regulations**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>New Jersey</th>
<th>Massachusetts</th>
<th>Pennsylvania</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen 7727-37-9</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Oxygen 7782-44-7</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Carbon monoxide 630-08-0</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Methane 74-82-8</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

**International Regulations**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Carcinogenicity</th>
<th>Exposure Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon monoxide</td>
<td>-</td>
<td>Mexico: TWA 50 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mexico: TWA 55 mg/ m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mexico: STEL 400 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mexico: STEL 400 mg/ m³</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>NPRI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon monoxide</td>
<td>X</td>
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</tbody>
</table>
16. OTHER INFORMATION

<table>
<thead>
<tr>
<th>NFPA</th>
<th>Health hazards</th>
<th>Flammability</th>
<th>Instability</th>
<th>Physical and Chemical Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>0</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.

**Issue Date** 20-Apr-2015  
**Revision Date** 20-Apr-2015  
**Revision Note** Initial Release.

**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