1. IDENTIFICATION

Product identifier

Product Name
CARBON MONOXIDE (<1%), HELIUM (<15%), OXYGEN (21-23%) in NITROGEN

Other means of identification

Safety data sheet number
LIND-M0050

UN/ID no.
UN1956

Trade name
LUNG DIFFUSION MIXTURE (Helium)

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

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>
### 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. This lung diffusion test mixture contain between 1,000 and 10,000 ppm carbon monoxide, sufficient oxygen to support life and 70,000-130,000 ppm helium. 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>Carbon monoxide 630-08-0</td>
<td>TWA: 25 ppm</td>
<td>TWA: 50 ppm</td>
<td>IDLH: 1200 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA: 55 mg/ m³ (vacated) TWA: 35 ppm</td>
<td>Ceiling: 229 mg/ m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(vacated) TWA: 40 mg/ m³</td>
<td>TWA: 35 ppm</td>
</tr>
</tbody>
</table>

Page 4 / 10
ACGIH TLV: American Conference of Governmental Industrial Hygienists - Threshold Limit Value. OSHA PEL: Occupational Safety and Health Administration - Permissible Exposure Limits. NIOSH IDLH: Immediately Dangerous to Life or Health.
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. 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.
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.

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>UN1956</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proper shipping name</td>
<td>Compressed gas, n.o.s.</td>
</tr>
<tr>
<td>Hazard Class</td>
<td>2.2</td>
</tr>
<tr>
<td>Description</td>
<td>UN1956, Compressed gas, n.o.s.(Carbon Monoxide, Oxygen) 2.2</td>
</tr>
<tr>
<td>Emergency Response Guide Number</td>
<td>126</td>
</tr>
</tbody>
</table>

TDG
UN/ID no. UN1956
Proper shipping name Compressed gas, n.o.s.
Hazard Class 2.2
Description UN1956, Compressed gas, n.o.s.(Carbon Monoxide, Oxygen), 2.2

MEX
UN/ID no. UN1956
Proper shipping name Compressed gas, n.o.s.
Hazard Class 2.2
Description UN1956, Compressed gas, n.o.s.(Carbon Monoxide, Oxygen), 2.2

IATA
UN/ID no. UN1956
Proper shipping name Compressed gas, n.o.s.
Hazard Class 2.2
ERG Code 2L
Description UN1956, Compressed gas, n.o.s.(Carbon Monoxide, Oxygen), 2.2

IMDG
UN/ID no. UN1956
Proper shipping name Compressed gas, n.o.s.
Hazard Class 2.2
EmS-No. F-C, S-V
Special Provisions 274
Description UN1956, Compressed gas, n.o.s. (Carbon Monoxide, Oxygen), 2.2

ADR
UN/ID no. UN1956
Proper shipping name Compressed gas, n.o.s.
Hazard Class 2.2
Classification code 1A
Tunnel restriction code (E)
Special Provisions 274, 655
Description UN1956, Compressed gas, n.o.s. (Carbon Monoxide, Oxygen), 2.2, (E)

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
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:

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></td>
<td></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></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>
</tr>
</tbody>
</table>

Legend
Canada NPRI - National Pollutant Release Inventory

16. OTHER INFORMATION
LIND-M0050 CARBON MONOXIDE (<1%), HELIUM (<15%), OXYGEN (21-23%) in NITROGEN

NFPA
Health hazards 0  Flammability 0  Instability 0  Physical and Chemical Properties -

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