METHYL CHLORIDE
Material Safety Data Sheet

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name          METHYL CHLORIDE
Product Code(s)       G-96
UN-Number             UN1063
Recommended Use       Compressed gas.
Synonyms              Chloromethane
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

DANGER!

Emergency Overview

- Flammable gas
- Irritating to eyes
- Contact with product may cause frostbite
- May cause central nervous system depression
- May adversely affect liver and kidney
- Contents under pressure
- Keep at temperatures below 52°F / 125°F

Appearance  Colorless  Physical State  Compressed gas.  Odor  Sweet
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. Eye contact.

Acute Toxicity

Inhalation
May cause central nervous system depression with nausea, headache, dizziness, vomiting, and incoordination. High concentrations can induce immediate CNS depression, vomiting, nausea, abdominal pain, diarrhea, kidney and liver damage, and death.

Eyes
Irritating to eyes. Contact with rapidly expanding gas near the point of release may cause frostbite.

Skin
None known. Contact with rapidly expanding gas near the point of release may cause frostbite.

Skin Absorption Hazard
May be harmful if absorbed through skin.

Ingestion
Not an expected route of exposure.

Chronic Effects
None known.

Aggravated Medical Conditions

Environmental Hazard
See Section 12 for additional Ecological Information.

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>Methyl chlorine</td>
<td>74-87-3</td>
<td>&gt;99</td>
<td>C₄H₈</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**
Flammable. Containers may explode when heated.

**Suitable Extinguishing Media**
Dry chemical or CO$_2$. Water spray or fog. DO NOT EXTINGUISH A LEAKING GAS FIRE UNLESS LEAK CAN BE STOPPED.

**Hazardous Combustion Products**

**Explosion Data**

**Sensitivity to Mechanical Impact**
None

**Sensitivity to Static Discharge**
Yes.

**Specific Hazards Arising from the Chemical**
Reacts with moisture in air or with water to form hydrochloric acid. May form explosive mixtures with air. Continue to cool fire exposed cylinders until flames are extinguished. Cylinders may rupture under extreme heat. Damaged cylinders should be handled only by specialists.

**Protective Equipment and Precautions for Firefighters**
If possible, stop the flow of gas. Do not extinguish the fire until supply is shut off as otherwise an explosive-ignition may occur. If the fire is extinguished and the flow of gas continues, use increased ventilation to prevent build-up of explosive atmosphere. Ventilation fans must be explosion proof. Use non-sparking tools to close container valves.

Isolate spill or leak area for at least 100 meters (330 feet) in all directions. Vapors from liquefied gas are initially heavier than air and spread along ground. Vapors may accumulate in confined areas (basement, tanks, hopper/ tank cars, etc.). Vapors may travel to source of ignition and flash back.

Use water spray to cool surrounding containers. Be cautious of a Boiling Liquid Evaporating Vapor Explosion, BLEVE, if flame is impinging on surrounding containers.

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**
ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Evacuate personnel to safe areas. Keep people away from and upwind of spill/ leak. All equipment used when handling the product must be grounded. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe.

**Environmental Precautions**
Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas. 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

Ground and bond all lines and equipment associated with product system. All equipment should be non-sparking and explosion proof. Remove all sources of ignition. Ensure adequate ventilation.

Most metals corrode with wet methyl chloride. Anhydrous methyl chloride (water content less than a dew point of -40°F (-40°C) can be handled in carbon or stainless steel, copper and bronze. Gasketing materials should be of Teflon® or Kel-F®.

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 equipment rated for cylinder pressure. Use backflow preventive device in piping.

Use an adjustable strap wrench to remove over-tight or rusted caps. 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.

Storage

Outside or detached storage is preferred. 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

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
<th>NIOSH IDLH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyl chloride</td>
<td>STEL: 100 ppm</td>
<td>TWA: 100 ppm</td>
<td>IDLH: 2000 ppm</td>
</tr>
<tr>
<td>74-87-3</td>
<td>TWA: 50 ppm</td>
<td>(vacated) TWA: 50 ppm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S*</td>
<td>(vacated) TWA: 105 mg/ m³</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(vacated) STEL: 100 ppm</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ceiling: 210 mg/ m³</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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</tr>
</tbody>
</table>

Immediately Dangerous to Life or Health.

Other Exposure Guidelines

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

Engineering Measures

Explosion proof ventilation systems. Showers. Eyewash stations. Exhaust gas should be vented to a gas treatment system.

Ventilation

Use ventilation adequate to keep exposures below recommended exposure limits.

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
Appropriate protective and chemical resistant gloves, clothing and splash protection, or fully
encapsulating vapor protective clothing to prevent exposure. For materials of construction consult
protective clothing manufacturer’s specifications.

Respiratory Protection

General Use
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.

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>10 ppm</td>
</tr>
<tr>
<td>Flash Point</td>
<td>32 °F / 0 °C</td>
</tr>
<tr>
<td>Autoignition Temperature</td>
<td>632 °C / 1170 °F</td>
</tr>
<tr>
<td>Boiling Point/ Boiling Range</td>
<td>-23.8 °C / -10.8 °F</td>
</tr>
<tr>
<td>Molecular Weight</td>
<td>50.49</td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>No information available</td>
</tr>
<tr>
<td>Vapor Density</td>
<td>1.45 (air = 1)</td>
</tr>
<tr>
<td>Flammability Limits in Air</td>
<td></td>
</tr>
<tr>
<td>Upper</td>
<td>17.2%</td>
</tr>
<tr>
<td>Lower</td>
<td>8.1%</td>
</tr>
<tr>
<td>Odor</td>
<td>Sweet</td>
</tr>
<tr>
<td>Physical State</td>
<td>Compressed gas</td>
</tr>
<tr>
<td>Flashpoint Method</td>
<td>Open cup</td>
</tr>
<tr>
<td>Decomposition Temperature</td>
<td>No information available.</td>
</tr>
<tr>
<td>Freezing Point</td>
<td>-97.6 °C / -143.7 °F</td>
</tr>
<tr>
<td>Water Solubility</td>
<td>Very slight</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>73.4 psia (STP)</td>
</tr>
<tr>
<td>VOC Content (%)</td>
<td>Not applicable.</td>
</tr>
</tbody>
</table>

10. STABILITY AND REACTIVITY

Stability
Stable below 399°C / 750°F. Hydrolyzes below 212°F / 100°C.

Incompatible Products
Reacts with zinc, its alloys and galvanized iron. Explodes on contact with magnesium. Reacts with
aluminum and its alloys to form methylated aluminum compounds which are flammable in air.
Reacts explosively with sodium and alkali metals.

Conditions to Avoid
Heat, flames and sparks.

Hazardous Decomposition Products
Carbon monoxide (CO). Phosgene.

Hazardous Polymerization
Hazardous polymerization does not occur.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity

LD50 Oral: No information available.
LD50 Dermal: No information available.
LC50 Inhalation: Per CGA P-20: 8300 ppm/ 1 hr (Rat)
Inhalation
In the body, methyl chloride is hydrolyzed to hydrochloric acid and methyl alcohol, which may cause degenerative changes in lung, brain, kidney and liver. Methyl chloride is readily absorbed by the body, but is very slowly eliminated, resulting in the possibility of latent toxicological effects. In fatal cases, autopsies have shown congestion of the lungs, liver and kidneys.

Eye Contact
May cause slight irritation.

Skin Contact
May cause irritation.

Repeated Dose Toxicity
Repeated exposure to methyl chloride can have neurological effects. Symptoms may include fatigue, mental confusion, headache, blurred vision, incoordination, and personality change.

Repeated animal inhalation exposures >500 ppm have been reported to adversely affect the liver and kidneys, causing testicular degeneration and development alternations (cardiac malformations).

Chronic Toxicity

Chronic Toxicity
None known.

Carcinogenicity
Contains no ingredient listed as a carcinogen.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>IARC</th>
<th>NTP</th>
<th>OSHA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyl chloride</td>
<td></td>
<td>Group 3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Irritation
No information available.

Sensitization
No information available.

Reproductive Toxicity
Reproductive toxicity was observed in male rats following an inhalation exposure (of unknown duration) of 2000 ppm for 6 hours.

Developmental Toxicity
Developmental defects were observed following inhalation exposure of pregnant female rats to 1500 ppm for 6 hours.

Synergistic Materials
None known.

Target Organ Effects

12. ECOLOGICAL INFORMATION

Ecotoxicity
A calculated BCF of 3 indicates a low potential for bioconcentration in aquatic organisms.

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

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Toxicity to Algae</th>
<th>Toxicity to Fish</th>
<th>Toxicity to Microorganisms</th>
<th>Daphnia Magna (Water Flea)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyl chloride</td>
<td></td>
<td>LC50 96 h: = 550 mg/ L static (Lepomis macrochirus)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Log Pow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyl chloride</td>
<td>0.91</td>
</tr>
</tbody>
</table>
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. This material, as supplied, is a hazardous waste according to federal regulations (40 CFR 261).

14. TRANSPORT INFORMATION

DOT

Proper shipping name: Methyl chloride
Hazard Class: 2.1
Subsidiary Class: None
UN-Number: UN1063
Description: UN1063,Methyl chloride,2.1
Additional Marking Requirements: If net weight of product is greater than or equal to .7 lbs., the container must also be marked with the letters "RQ".
Emergency Response Guide Number: 115

TDG

Proper Shipping Name: Methyl chloride
Hazard Class: 2.1
UN-Number: UN1063
Description: UN1063, METHYL CHLORIDE,2.1

MEX

Proper Shipping Name: Methyl chloride
Hazard Class: 2.1
UN-Number: UN1063
Description: UN1063, Methyl chloride,2.1

IATA

UN-Number: UN1063
Proper Shipping Name: Methyl chloride
Hazard Class: 2.1
ERG Code: 10L
Description: UN1063,Methyl chloride,2.1
Maximum Quantity for Passenger: Forbidden
Maximum Quantity for Cargo Only: 100 kg
Limited Quantity: No information available.

IMDG/IMO

Proper Shipping Name: Methyl chloride
Hazard Class: 2.1
UN-Number: UN1063
EmS No.: F-D, S-U
Description: UN1063, Methyl chloride,2.1, FP 0C

ADR

Proper Shipping Name: Methyl chloride (Refrigerant gas R 40)
15. REGULATORY INFORMATION

International Inventories

<table>
<thead>
<tr>
<th>TSCA</th>
<th>Complies</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSL</td>
<td>Complies</td>
</tr>
<tr>
<td>EINECS/ELINCS</td>
<td>Complies</td>
</tr>
</tbody>
</table>

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 contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372:

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS-No</th>
<th>SARA 313 - Threshold Values %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyl chloride</td>
<td>74-87-3</td>
<td>1.0</td>
</tr>
</tbody>
</table>

**SARA 311/312 Hazard Categories**

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

**Clean Water Act**

This product contains the following substances which are regulated pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42):

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CWA - Reportable Quantities</th>
<th>CWA - Toxic Pollutants</th>
<th>CWA - Priority Pollutants</th>
<th>CWA - Hazardous Substances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyl chloride</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

**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>Methyl chloride</td>
<td>10000 lbs</td>
<td></td>
<td>15000 lb</td>
</tr>
</tbody>
</table>

**Clean Air Act, Section 112 Hazardous Air Pollutants (HAPs) (see 40 CFR 61)**

This product contains the following substances which are listed hazardous air pollutants (HAPS) under Section 112 of the Clean Air Act:
CERCLA/ SARA
This material, as supplied, contains one or more 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):

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Hazardous Substances RQs</th>
<th>Extremely Hazardous Substances RQs</th>
<th>TPQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyl chloride</td>
<td>100 lb</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

U.S. State Regulations

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

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS-No</th>
<th>California Prop. 65</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyl chloride</td>
<td>74-87-3</td>
<td>Developmental Male Reproductive</td>
</tr>
</tbody>
</table>

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>
</tr>
</thead>
<tbody>
<tr>
<td>Methyl chloride</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

International Regulations

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Carcinogen Status</th>
<th>Exposure Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyl chloride</td>
<td></td>
<td>Mexico: TWA 50 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mexico: TWA 105 mg/ m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mexico: STEL 100 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mexico: STEL 205 mg/ m³</td>
</tr>
</tbody>
</table>

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
B1 Flammable gas
D2B Toxic materials

Legend
NPRI - National Pollutant Release Inventory
Prepared By: Product Stewardship  
23 British American Blvd.  
Latham, NY 12110  
1-800-572-6501

Issuing Date: 05-Mar-2010

Revision Date: 27-Sep-2013

Revision Number: 2

Revision Note: Not applicable.

<table>
<thead>
<tr>
<th>NFPA</th>
<th>Health Hazard</th>
<th>Flammability</th>
<th>Stability</th>
<th>Physical and Chemical Hazards</th>
</tr>
</thead>
<tbody>
<tr>
<td>HMIS</td>
<td>Health Hazard</td>
<td>Flammability</td>
<td>Physical Hazard</td>
<td>Personal Protection</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.

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES
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End of Safety Data Sheet