1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: CHLORODIFLUOROMETHANE (Halocarbon R22)
Product Code(s): G-46
UN-Number: UN1018
Recommended Use: Refrigerant.
Synonyms: Chlorofluoromethane, Difluoromonochloromethane, Monochlorodifluoromethane, FC-22, HCFC-22
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

Asphyxiant at high concentrations
Contact with liquid may cause frostbite
Contents under pressure
May cause central nervous system depression
Causes adverse cardiovascular effects

Keeping at temperatures below 52°C / 125°F

Appearance: Colorless
Physical State: Compressed gas.
Odor: Slight ethereal

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**
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. Oxygen deficiency may occur in the presence of high concentrations resulting in asphyxiation. Maintain oxygen levels at or above 19.5%.

**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.

#### Chronic Effects
Possible risks of irreversible effects

#### Aggravated Medical Conditions
Central nervous system. Cardiovascular. Heart.

#### Interactions with Other Chemicals
Use of alcoholic beverages may enhance toxic effects.

#### 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>Chlorodifluoromethane</td>
<td>75-45-6</td>
<td>&gt;99</td>
<td>CHF₂Cl</td>
</tr>
</tbody>
</table>

### 4. FIRST AID MEASURES

#### General Advice
Immediate medical attention is required. Show this safety data sheet to the doctor in attendance.

#### 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 immediately if symptoms occur.

#### Notes to Physician
A patient adversely affected by exposure to this product should not be given adrenaline (epinephrine) or similar heart stimulant since these would increase the risk of cardiac arrhythmias.
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 Use only in ventilated areas. 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. 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. Close valve after each use and when empty. 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 (CGA) Safety Bulletin SB-2, Oxygen-Deficient Atmospheres.

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

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
<th>NIOSH IDLH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorodifluoromethane</td>
<td>TWA: 1000 ppm</td>
<td>(vacated) TWA: 1000 ppm</td>
<td>TWA: 1000 ppm</td>
</tr>
<tr>
<td>75-45-6</td>
<td></td>
<td>(vacated) TWA: 3500 mg/ m³</td>
<td>TWA: 3500 mg/ m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>STEL: 1250 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>STEL: 4375 mg/ m³</td>
</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
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%).
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>-160 °C / -256 °F</td>
</tr>
<tr>
<td>Water Solubility</td>
<td>Slightly soluble</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>136 PSIA @ 70°F</td>
</tr>
<tr>
<td>VOC Content (%)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Odor</td>
<td>Slight ethereal</td>
</tr>
<tr>
<td>Physical State</td>
<td>Compressed gas</td>
</tr>
<tr>
<td>Autoignition Temperature</td>
<td>No information available</td>
</tr>
<tr>
<td>Boiling Point/Boiling Range</td>
<td>-40.8 °C / -41.4 °F</td>
</tr>
<tr>
<td>Molecular Weight</td>
<td>86.47</td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>No information available</td>
</tr>
<tr>
<td>Vapor Density</td>
<td>3.06 (air = 1)</td>
</tr>
<tr>
<td>Flammability Limits in Air</td>
<td></td>
</tr>
<tr>
<td>Upper</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Lower</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

10. STABILITY AND REACTIVITY

Stability: Stable.

Incompatible Products: May react violently with chemically active metals such as sodium, potassium and barium, powdered magnesium, powdered aluminum and organometallics.

Conditions to Avoid: Heat, flames and sparks.


Hazardous Polymerization: Hazardous polymerization does not occur.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity: No information available.

LD50 Oral: No information available.

LD50 Dermal: No information available.

LC50 Inhalation: No information available.

Inhalation: High concentrations may cause ventricular fibrillation and CNS effects.

Eye Contact: May cause slight irritation.

Skin Contact: May cause irritation.

Repeated Dose Toxicity: No information available.

Chronic Toxicity: Possible risks of irreversible effects.

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>Chlorodifluoromethane</td>
<td>Group 3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Irritation**
No information available.

**Sensitization**
No information available.

**Mutagenic Effects**
Mutations were produced in a bacterial (S. typhimurium) assay system at 330,000 ppm.

**Reproductive Toxicity**
Exposure to male rats to 50,000 ppm for 5 hours adversely affected the reproductive system.

**Developmental Toxicity**
Oxygen deficiency during pregnancy has produced developmental abnormalities in humans and experimental animals.

**Synergistic Materials**
None known.

**Target Organ Effects**
Central nervous system (CNS), Heart.

### 12. ECOLOGICAL INFORMATION

**Ecotoxicity**
Product is known to contribute to the destruction of the ozone layer.

**Ozone depletion potential; ODP; (R-11 = 1):** 0.055 ODP Class II.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Log Pow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorodifluoromethane</td>
<td>1.08</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.

### 14. TRANSPORT INFORMATION

**DOT**

- **Proper shipping name**: Chlorodifluoromethane
- **Hazard Class**: 2.2
- **UN-Number**: UN1018
- **Description**: UN1018, Chlorodifluoromethane, 2.2
- **Emergency Response Guide Number**: 126

**TDG**

- **Proper Shipping Name**: Chlorodifluoromethane
- **Hazard Class**: 2.2
- **UN-Number**: UN1018
- **Description**: UN1018, CHLORODIFLUOROMETHANE, 2.2
CHLORODIFLUOROMETHANE (Halocarbon R22), Material Safety Data Sheet, Revision Date 12-Sep-2013, Page 7 / 9

___________________________________________________________________

MEX

Proper Shipping Name: Chlorodifluoromethane
Hazard Class: 2.2
UN-Number: UN1018
Description: UN1018, Chlorodifluoromethane, 2.2

IATA

UN-Number: UN1018
Proper Shipping Name: Chlorodifluoromethane
Hazard Class: 2.2
ERG Code: 2L
Description: UN1018, Chlorodifluoromethane, 2.2
Maximum Quantity for Passenger: 75 kg
Maximum Quantity for Cargo Only: 150 kg
Limited Quantity: No information available.

IMDG/IMO

Proper Shipping Name: Chlorodifluoromethane
Hazard Class: 2.2
UN-Number: UN1018
EmS No.: F-C, S-V
Description: UN1018, Chlorodifluoromethane, 2.2

ADR

Proper Shipping Name: Chlorodifluoromethane (Refrigerant gas R22)
Hazard Class: 2.2
UN-Number: UN1018
Classification Code: 2A
Description: UN1018, Chlorodifluoromethane (Refrigerant gas R22), 2.2

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>Chlorodifluoromethane</td>
<td>75-45-6</td>
<td>1.0</td>
</tr>
</tbody>
</table>
**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 contains 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>Chlorodifluoromethane</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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 contains the following substances which are listed hazardous air pollutants (HAPs) under Section 112 of the Clean Air Act:

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS-No</th>
<th>HAPS data</th>
<th>VOC Chemicals</th>
<th>Class 1 Ozone Depleters</th>
<th>Class 2 Ozone Depleters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorodifluoromethane</td>
<td>75-45-6</td>
<td>Group 1</td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

**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>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorodifluoromethane</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></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>Chlorodifluoromethane</td>
<td></td>
<td>Mexico: TWA 1000 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mexico: TWA 3500 mg/ m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mexico: STEL 1250 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mexico: STEL 4375 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

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>NPRI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorodifluoromethane</td>
<td>X</td>
</tr>
</tbody>
</table>

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        12-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</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Hazards</td>
</tr>
</tbody>
</table>

<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></td>
<td></td>
<td></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.

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES
Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained herein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).

End of Safety Data Sheet