



# Carbon dioxide, refrigerated liquid

## Safety Data Sheet E-4573

according to the Hazardous Products Regulation (February 11, 2015)

Date of issue: 10-15-1979

Revision date: 09-29-2023

Supersedes: 05-12-2023

Version: 1.1

### SECTION 1: Identification

#### 1.1. Product identifier

Product form : Substance  
Substance name : Carbon dioxide, refrigerated liquid  
CAS No : 124-38-9  
Formula : CO<sub>2</sub>  
Other means of identification : Liquid Carbon Dioxide, Medipure®,  
Product group : Core Products

#### 1.2. Recommended use and restrictions on use

Recommended uses and restrictions : Industrial use, Medical applications, Semiconductor, Food/Beverage applications, Use as directed.

#### 1.3. Supplier

Linde Canada inc.  
500 — 5015 Spectrum Way  
Mississauga - Canada L4W 0E4  
T 1-905-803-1600 - F 1-905-803-1682  
[www.lindecana.ca](http://www.lindecana.ca)

#### 1.4. Emergency telephone number

Emergency number : 1-800-363-0042  
Call emergency number 24 hours a day only for spills, leaks, fire, exposure, or accidents involving this product.  
For routine information, contact your supplier or Linde sales representative.

### SECTION 2: Hazard identification

#### 2.1. Classification of the substance or mixture

##### GHS-CA classification

Gases under pressure : Refrigerated liquefied gas H281  
Simple Asphyxiant

#### 2.2. GHS Label elements, including precautionary statements

##### GHS-CA labelling

Hazard pictograms



GHS04

Signal word

: WARNING

Hazard statements

: CONTAINS REFRIGERATED GAS; MAY CAUSE CRYOGENIC BURNS OR INJURY  
MAY DISPLACE OXYGEN AND CAUSE RAPID SUFFOCATION

Precautionary statements

: Do not handle until all safety precautions have been read and understood  
Use and store only outdoors or in a well-ventilated place.  
Wear protective gloves/protective clothing/eye protection/face protection  
Wear cold insulating gloves and either face shield or eye protection  
Use a back flow preventive device in the piping.  
DO NOT change or force fit connections.  
Use only with equipment rated for cylinder pressure.  
Do not open valve until connected to equipment prepared for use.  
Close valve after each use and when empty.  
Always keep container in upright position.

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Protect from sunlight when ambient temperature exceeds 52°C (125°F).  
IF INHALED: Remove person to fresh air and keep comfortable for breathing.  
IF exposed or concerned: Get medical advice/attention  
IF ON SKIN:  
Thaw frosted parts with lukewarm water. Do not rub affected area. Get immediate medical advice/attention

### 2.3. Other hazards

Other hazards which do not result in classification : Asphyxiant in high concentrations. Contact with liquid may cause cold burns/frostbite.

### 2.4. Unknown acute toxicity (GHS CA)

Not applicable

## SECTION 3: Composition/information on ingredients

### 3.1. Substances

Name	CAS No.	% (Vol.)	Common Name (synonyms)
Carbon dioxide, refrigerated liquid (Main constituent)	(CAS No) 124-38-9	100	CARBON DIOXIDE

### 3.2. Mixtures

Not applicable

## SECTION 4: First-aid measures

### 4.1. Description of first aid measures

First-aid measures after inhalation : Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped. Remove to fresh air and keep at rest in a position comfortable for breathing. If not breathing, give artificial respiration. If breathing is difficult, trained personnel should give oxygen. Call a physician.

First-aid measures after skin contact : The liquid may cause frostbite. For exposure to liquid, immediately warm frostbite area with warm water not to exceed 105°F (41°C). Water temperature should be tolerable to normal skin. Maintain skin warming for at least 15 minutes or until normal coloring and sensation have returned to the affected area. In case of massive exposure, remove clothing while showering with warm water. Seek medical evaluation and treatment as soon as possible.

First-aid measures after eye contact : Immediately flush eyes thoroughly with water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Contact an ophthalmologist immediately. Get immediate medical attention. Immediately flush eyes thoroughly with water for at least 15 minutes.

First-aid measures after ingestion : Ingestion is not considered a potential route of exposure.

### 4.2. Most important symptoms and effects (acute and delayed)

Symptoms/injuries : No additional information available

### 4.3. Immediate medical attention and special treatment, if necessary

Other medical advice or treatment : None.

## SECTION 5: Fire-fighting measures

### 5.1. Suitable extinguishing media

Suitable extinguishing media : Use extinguishing media appropriate for surrounding fire.

### 5.2. Unsuitable extinguishing media

No additional information available

### 5.3. Specific hazards arising from the hazardous product

Explosion hazard : CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED.

Reactivity : No reactivity hazard other than the effects described in sub-sections below.

Reactivity in case of fire : No reactivity hazard other than the effects described in sub-sections below.

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### 5.4. Special protective equipment and precautions for fire-fighters

Firefighting instructions	: DANGER! Extremely cold liquid and gas under pressure. Take care not to direct spray onto vents on top of container. Do not discharge sprays directly into liquid; cryogenic liquid can freeze water rapidly.  Evacuate all personnel from the danger area. Use self-contained breathing apparatus (SCBA) and protective clothing. Immediately cool containers with water from maximum distance. Stop flow of gas if safe to do so, while continuing cooling water spray. Remove ignition sources if safe to do so. Remove containers from area of fire if safe to do so. On-site fire brigades must comply with their provincial and local fire code regulations.
Protection during firefighting	: Compressed gas: asphyxiant. Suffocation hazard by lack of oxygen.
Special protective equipment for fire fighters	: Use self-contained breathing apparatus. Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters.
Specific methods	: Stop flow of product if safe to do so. Use fire control measures appropriate for the surrounding fire. Exposure to fire and heat radiation may cause gas containers to rupture. Cool endangered containers with water spray jet from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems. Use water spray or fog to knock down fire fumes if possible. If leaking do not spray water onto container. Water surrounding area (from protected position) to contain fire. Exposure to fire may cause containers to rupture/explode.
Other information	: Cryogenic liquid causes severe frostbite, a burn-like injury. Heat of fire can build pressure in a closed container and cause it to rupture. Venting vapors may obscure visibility. Air will condense on surfaces such as vaporizers or piping exposed to liquid or cold gas. Nitrogen, which has a lower boiling point than oxygen, evaporates first, leaving an oxygen-enriched condensate.  Containers are equipped with a pressure relief device. (Exceptions may exist where authorized.).

## SECTION 6: Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures

General measures	: Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous. Evacuate area. Ensure adequate air ventilation. Wear self-contained breathing apparatus when entering area unless atmosphere is proven to be safe. Stop leak if safe to do so.
Personal Precautions, Protective Equipment and Emergency Procedures	: General measures : Ensure adequate ventilation. Personal Precautions, Protective Equipment and Emergency Procedures : EVACUATE ALL PERSONNEL FROM AFFECTED AREA. Use appropriate protective equipment. If leak is on user's equipment, be certain to purge piping before attempting repairs. If leak is on a container or container valve contact the closest Linde Canada location.

### 6.2. Methods and materials for containment and cleaning up

For containment	: Try to stop release if safe to do so.
Methods for cleaning up	: Dispose of contents/container in accordance with local/regional/national/international regulations. Contact supplier for any special requirements.

## SECTION 7: Handling and storage

### 7.1. Precautions for safe handling

Precautions for safe handling	: Wear leather safety gloves and safety shoes when handling cylinders. Protect cylinders from physical damage; do not drag, roll, slide or drop. While moving cylinder, always keep in place removable valve cover. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Never insert an object (e.g. wrench, screwdriver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. Slowly open the valve. If the valve is hard to open, discontinue use and contact your supplier. Close the container valve after each use; keep closed even when empty. Never apply flame or localized heat directly to any part of the container. High temperatures may damage the container and could cause the pressure relief device to fail prematurely, venting the container contents. For other precautions in using this product, see section 16.
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### 7.2. Conditions for safe storage, including any incompatibilities

Storage conditions : Store in a cool, well-ventilated place. Store and use with adequate ventilation. Store only where temperature will not exceed 52 °C (125 °F). Firmly secure containers upright to keep them from falling or being knocked over. Install valve protection cap firmly in place by hand. Store full and empty containers separately. Use a first-in, first-out inventory system to prevent storing full containers for long periods.

**OTHER PRECAUTIONS FOR HANDLING, STORAGE, AND USE:** When handling product under pressure, use piping and equipment adequately designed to withstand the pressures to be encountered. Never work on a pressurized system. Use a back flow preventive device in the piping. Gases can cause rapid suffocation because of oxygen deficiency; store and use with adequate ventilation. If a leak occurs, close the container valve and blow down the system in a safe and environmentally correct manner in compliance with all international, federal/national, state/provincial, and local laws; then repair the leak. Never place a container where it may become part of an electrical circuit.

## SECTION 8: Exposure controls/personal protection

### 8.1. Control parameters

Carbon dioxide, refrigerated liquid (124-38-9)		
USA - ACGIH	ACGIH OEL TWA [ppm]	5000 ppm
USA - ACGIH	ACGIH OEL STEL [ppm]	30000 ppm
USA - OSHA	OSHA PEL TWA [1]	9000 mg/m <sup>3</sup>
USA - OSHA	OSHA PEL TWA [2]	5000 ppm
Canada (Quebec)	VECD (OEL STEL)	54000 mg/m <sup>3</sup>
Canada (Quebec)	VECD (OEL STEL) [ppm]	30000 ppm
Canada (Quebec)	VEMP (OEL TWA)	9000 mg/m <sup>3</sup>
Canada (Quebec)	VEMP (OEL TWA) [ppm]	5000 ppm
Alberta	OEL STEL	54000 mg/m <sup>3</sup>
Alberta	OEL STEL [ppm]	30000 ppm
Alberta	OEL TWA	9000 mg/m <sup>3</sup>
Alberta	OEL TWA [ppm]	5000 ppm
British Columbia	OEL STEL [ppm]	15000 ppm
British Columbia	OEL TWA [ppm]	5000 ppm
Manitoba	OEL STEL [ppm]	30000 ppm
Manitoba	OEL TWA [ppm]	5000 ppm
New Brunswick	OEL STEL	54000 mg/m <sup>3</sup>
New Brunswick	OEL STEL [ppm]	30000 ppm
New Brunswick	OEL TWA	9000 mg/m <sup>3</sup>
New Brunswick	OEL TWA [ppm]	5000 ppm
New Foundland & Labrador	OEL STEL [ppm]	30000 ppm
New Foundland & Labrador	OEL TWA [ppm]	5000 ppm
Nova Scotia	OEL STEL [ppm]	30000 ppm
Nova Scotia	OEL TWA [ppm]	5000 ppm
Nunavut	OEL STEL [ppm]	30000 ppm
Nunavut	OEL TWA [ppm]	5000 ppm
Northwest Territories	OEL STEL [ppm]	30000 ppm
Northwest Territories	OEL TWA [ppm]	5000 ppm
Ontario	OEL STEL [ppm]	30000 ppm
Ontario	OEL TWA [ppm]	5000 ppm
Prince Edward Island	OEL STEL [ppm]	30000 ppm

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### Carbon dioxide, refrigerated liquid (124-38-9)

Prince Edward Island	OEL TWA [ppm]	5000 ppm
Québec	VECD (OEL STEL)	54000 mg/m <sup>3</sup>
Québec	VECD (OEL STEL) [ppm]	30000 ppm
Québec	VEMP (OEL TWA)	9000 mg/m <sup>3</sup>
Québec	VEMP (OEL TWA) [ppm]	5000 ppm
Saskatchewan	OEL STEL [ppm]	30000 ppm
Saskatchewan	OEL TWA [ppm]	5000 ppm
Yukon	OEL STEL	27000 mg/m <sup>3</sup>
Yukon	OEL STEL [ppm]	15000 ppm
Yukon	OEL TWA	9000 mg/m <sup>3</sup>
Yukon	OEL TWA [ppm]	5000 ppm

### 8.2. Appropriate engineering controls

Appropriate engineering controls : Oxygen detectors should be used when asphyxiating gases may be released. Ensure exposure is below occupational exposure limits (where available). Provide adequate general and local exhaust ventilation.

### 8.3. Individual protection measures/Personal protective equipment

Personal protective equipment : Safety glasses. Face shield. Gloves.



Hand protection : Wear working gloves when handling gas containers. Wear work gloves when handling containers. Wear heavy rubber gloves where contact with product may occur.

Eye protection : Wear safety glasses with side shields. Wear goggles and a face shield when transfilling or breaking transfer connections. Select in accordance with the current CSA standard Z94.3, "Industrial Eye and Face Protection", and any provincial regulations, local bylaws or guidelines. Safety eye wear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts. Select in accordance with the current CSA standard Z94.3, "Industrial Eye and Face Protection", and any provincial regulations, local bylaws or guidelines.

Respiratory protection : **Respiratory protection:** Use air supplied respirator when working in confined space or where local exhaust or ventilation does not keep exposure below OEL (if applicable). Select in accordance with provincial regulations, local bylaws or guidelines. Respirators should also be approved by NIOSH and MSHA. For emergencies or instances with unknown exposure levels, use a self-contained breathing apparatus (SCBA).

Thermal hazard protection : Wear cold insulating gloves when transfilling or breaking transfer connections.

Environmental exposure controls : None necessary.

Other information : **Other protection :** Safety shoes for general handling at customer sites. Metatarsal shoes and cuffless trousers for cylinder handling at packaging and filling plants. Select in accordance with the current CSA standard Z195, "Protective Foot Wear", and any provincial regulations, local bylaws or guidelines. For working with flammable and oxidizing materials, consider the use of flame resistant anti-static safety clothing.

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

- |                               |                                |
|-------------------------------|--------------------------------|
| (a) Physical state            | : Gas                          |
| (b) Colour                    | : Colourless.                  |
| (c) Odour                     | : No odour warning properties. |
| Odour threshold               | : No data available            |
| (d) Melting point             | : -78.5 °C                     |
| Freezing point                | : No data available            |
| (e) Boiling point             | : -78.4 °C                     |
| (f) Flammability              | : Non flammable                |
| (g) Flammability (solid, gas) | :                              |

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(h) Flash point	: No data available
(i) Auto-ignition temperature	: Not applicable.
(j) Decomposition temperature	: No data available
(k) pH	: 3.7 (carbonic acid)
(l) Viscosity, kinematic	: Not applicable.
(m) Solubility	: Water: 2000 mg/l Completely soluble.
(n) Partition coefficient – n-octanol/water [log Pow/log Kow]	: 0.83
(o) Vapour pressure	: 5730 kPa
(p) Density	: 762 kg/m <sup>3</sup>
Relative gas density	: 1.52
(r) Particle characteristics	: No data available
(s) Molecular mass	: 44 g/mol
(t) Critical temperature	: 31 °C
(u) Critical pressure	: 7375 kPa
(v) Oxidizing properties	: None.
(w) Relative evaporation rate (butylacetate=1)	: No data available
Relative evaporation rate (ether=1)	: Not applicable.

### 9.2. Other information

Sublimation point	: -78.5 °C
Gas group	: Refrigerated liquefied gas
Additional information	: Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

## SECTION 10: Stability and reactivity

Reactivity	: No reactivity hazard other than the effects described in sub-sections below.
Chemical stability	: Stable under normal conditions.
Possibility of hazardous reactions	: None.
Conditions to avoid	: None.
Incompatible materials	: Alkali metals, Alkaline earth metals, Acetylide forming metals, Chromium, Titanium > 1022°F (550°C), Uranium (U) > 1382°F (750°C), Magnesium > 1427°F (775°C).
Hazardous decomposition products	: Electrical discharges and high temperatures decompose carbon dioxide into carbon monoxide and oxygen. The welding process may generate hazardous fumes and gases. If using carbon dioxide for welding and cutting, see the SDS.

## SECTION 11: Toxicological information

**11.1 Likely routes of exposure** : Inhalation. Skin contact. Eye contact.

**11.2 Symptoms related to the physical, chemical, and toxicological characteristics** : No additional information available

### 11.3 Delayed and immediate effects and chronic effects

Acute toxicity (oral)	: Not classified
Acute toxicity (dermal)	: Not classified
Acute toxicity (inhalation)	: Not classified

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Skin corrosion/irritation	: Not classified pH: 3.7 (carbonic acid)
Serious eye damage/irritation	: Not classified pH: 3.7 (carbonic acid)
Respiratory or skin sensitization	: Not classified
Germ cell mutagenicity	: Not classified
Carcinogenicity	: Not classified
Reproductive toxicity	: Not classified
Specific target organ toxicity (single exposure)	: Not classified
Specific target organ toxicity (repeated exposure)	: Not classified
Aspiration hazard	: Not classified

### 11.4 Toxicity

Carbon dioxide, refrigerated liquid (1f)124-38-9	
LC50 inhalation rat (ppm)	No data available
Additional information	Low concentrations of CO2 cause increased respiration and headache

## SECTION 12: Ecological information

### 12.1. Toxicity

Ecology - general : No ecological damage caused by this product.

### 12.2. Persistence and degradability

Carbon dioxide, refrigerated liquid (124-38-9)	
Persistence and degradability	No ecological damage caused by this product.

### 12.3. Bioaccumulative potential

Carbon dioxide, refrigerated liquid (124-38-9)	
BCF - Fish [1]	No bioaccumulation
Log Pow	0.83
Log Kow	Not applicable.
Bioaccumulative potential	No ecological damage caused by this product.

### 12.4. Mobility in soil

Carbon dioxide, refrigerated liquid (124-38-9)	
Mobility in soil	No data available.
Log Pow	0.83
Log Kow	Not applicable.
Ecology - soil	No ecological damage caused by this product.

### 12.5. Other adverse effects

Other adverse effects : Can cause frost damage to vegetation.  
Effect on the ozone layer : None.  
Global warming potential [CO2=1] : 1  
Effect on global warming : When discharged in large quantities may contribute to the greenhouse effect.

## SECTION 13: Disposal considerations

Product/Packaging disposal recommendations : Do not attempt to dispose of residual or unused quantities. Return container to supplier. Dispose of contents/container in accordance with local/regional/national/international regulations. Contact supplier for any special requirements.

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### SECTION 14: Transport information

#### 14.1. Basic shipping description

In accordance with TDG

##### TDG

UN-No. (TDG) : UN2187  
TDG Primary Hazard Classes : 2.2 - Class 2.2 - Non-Flammable, Non-Toxic Gases  
Proper shipping name : CARBON DIOXIDE, REFRIGERATED LIQUID  
  
Explosive Limit and Limited Quantity Index : 0.125 L  
Passenger Carrying Ship Index : Forbidden  
Passenger Carrying Road Vehicle or Passenger Carrying Railway Vehicle Index : 50 L

#### 14.2. Air and sea transport

##### IMDG

UN-No. (IMDG) : 2187  
Proper Shipping Name (IMDG) : CARBON DIOXIDE, REFRIGERATED LIQUID  
Class (IMDG) : 2 - Gases  
MFAG-No : 120

##### IATA

UN-No. (IATA) : 2187  
Proper Shipping Name (IATA) : Carbon dioxide, refrigerated liquid  
Class (IATA) : 2 - Gases

### SECTION 15: Regulatory information

#### 15.1. National regulations

##### Carbon dioxide, refrigerated liquid (124-38-9)

Listed on the Canadian DSL (Domestic Substances List)

#### 15.2. International regulations

##### Carbon dioxide, refrigerated liquid (124-38-9)

Listed on the AICS (Australian Inventory of Chemical Substances)  
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)  
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)  
Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory  
Listed on the Japanese ISHL (Industrial Safety and Health Law)  
Listed on the Korean ECL (Existing Chemicals List)  
Listed on NZIoC (New Zealand Inventory of Chemicals)  
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)  
Listed on the United States TSCA (Toxic Substances Control Act) inventory  
Listed on INSQ (Mexican National Inventory of Chemical Substances)

### SECTION 16: Other information

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Indication of changes:

Training advice : The hazard of asphyxiation is often overlooked and must be stressed during operator training.





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### Other information

: When you mix two or more chemicals, you can create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an industrial hygienist or other trained person when you evaluate the end product. Before using any plastics, confirm their compatibility with this product.

Linde Canada asks users of this product to study this SDS and become aware of the product hazards and safety information. To promote safe use of this product, a user should (1) notify employees, agents, and contractors of the information in this SDS and of any other known product hazards and safety information, (2) furnish this information to each purchaser of the product, and (3) ask each purchaser to notify its employees and customers of the product hazards and safety information.

The opinions expressed herein are those of qualified experts within Linde Canada Inc. We believe that the information contained herein is current as of the date of this Safety Data Sheet. Since the use of this information and the conditions of use are not within the control of Linde Canada Inc, it is the user's obligation to determine the conditions of safe use of the product. Linde Canada Inc, SDSs are furnished on sale or delivery by Linde Canada Inc, or the independent distributors and suppliers who package and sell our products. To obtain current SDSs for these products, contact your Linde sales representative, local distributor, or supplier, or download from [www.lindecana.ca](http://www.lindecana.ca).

### NFPA health hazard

: 3 - Short exposure could cause serious temporary or residual injury even though prompt medical attention was given.

### NFPA fire hazard

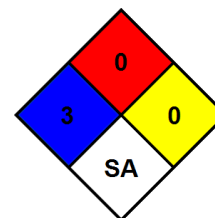
: 0 - Materials that will not burn.

### NFPA instability

: 0 - Normally stable, even under fire exposure conditions, and are not reactive with water.

### NFPA specific hazard

: SA - This denotes gases which are simple asphyxiants.



### HMIS III Rating

#### Health

: 3 Serious Hazard - Major injury likely unless prompt action is taken and medical treatment is given

#### Flammability

: 0 Minimal Hazard - Materials that will not burn

#### Physical

: 2 Moderate Hazard - Materials that are unstable and may undergo violent chemical changes at normal temperature and pressure with low risk for explosion. Materials may react violently with water or form peroxides upon exposure to air.

### SDS Canada (GHS) - Linde NEW

*This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.*