

### Warning



## SECTION 1: Identification of the hazardous chemical and of the supplier

### 1.1. Product identifier

Trade name : Carbon dioxide (refrigerated)  
Name : Carbon dioxide (refrigerated)  
CAS-No. : 124-38-9  
Formula : CO<sub>2</sub>

### 1.2. Other means of identification

Product code : ALM/SDS/94

### 1.3. Recommended use of the chemical and restrictions on use

Recommended use : Industrial and professional uses. Perform risk assessment prior to use.  
Test gas/Calibration gas.  
Use for manufacture of electronic/photovoltaic components.  
Laboratory use.  
Contact supplier for more information on uses.

Restrictions on use : Consumer use.

### 1.4. Supplier details

AIR LIQUIDE MALAYSIA SDN. BHD.  
Lot PT 2317, No. 21, Jalan PTB 1  
Kawasan Perindustrian Tangga Batu, Mukim Sungai Udang,  
76400 Melaka  
Malaysia  
T +606-3513512

### 1.5. Emergency phone number

Emergency number : +606-3513512

## SECTION 2: Hazards identification

### 2.1. Classification of the hazardous chemical

Classification according to Industry Code of Practice on chemicals classification and hazard communication (2019)

Gases under pressure : Refrigerated liquefied gas H281

### 2.2. Label elements

Labelling according to Industry Code of Practice on chemicals classification and hazard communication (2019)

Hazard pictograms (GHS MY) :



Signal word (GHS MY) : Warning  
Hazard statements (GHS MY) : H281 - Contains refrigerated gas; may cause cryogenic burns or injury  
Precautionary statements (GHS MY) : P282 - Wear cold insulating gloves/face shield/eye protection  
P315 - Get immediate medical advice/attention  
P336 - Thaw frosted parts with lukewarm water. Do no rub affected area  
P403 - Store in a well-ventilated place

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### 2.3. Other hazards that do not result in classification

Other hazards which do not result in classification : In high concentrations CO<sub>2</sub> causes rapid circulatory insufficiency even at normal levels of oxygen concentration. Symptoms are headache, nausea and vomiting, which may lead to unconsciousness and death, Not classified as PBT or vPvB, Asphyxiant in high concentrations, The substance/mixture has no endocrine disrupting properties.

## SECTION 3: Composition and information of the ingredients of the hazardous chemical

### 3.1. Substances

Name	Product identifier	%
Carbon dioxide (refrigerated) (Main constituent)	CAS-No.: 124-38-9	100

Full text of H-statements: see section 16

### 3.2. Mixtures

Not applicable

## SECTION 4: First-aid measures

### 4.1. Description of necessary 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. Perform cardiopulmonary resuscitation if breathing stopped.

First-aid measures after skin contact : In case of frostbite spray with water for at least 15 minutes. Apply a sterile dressing. Obtain medical assistance.

First-aid measures after eye contact : 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/effects, acute and delayed

Most important symptoms and effects, both acute and delayed : Low concentrations of CO<sub>2</sub> cause increased respiration and headache. In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. See section 11.

### 4.3. Indication of immediate medical attention and special treatment needed, if necessary

Other medical advice or treatment : None.

## SECTION 5: Fire-fighting measures

### 5.1. Suitable extinguishing media

Suitable extinguishing media : Water spray or fog. Product does not burn, use fire control measures appropriate for the surrounding fire.

Unsuitable extinguishing media : Do not use water jet to extinguish.

### 5.2. Physicochemical hazards arising from the chemical

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

Hazardous combustion products : None.

### 5.3. Special protective equipment and precautions for fire fighters

Special protective equipment for fire fighters : In confined space use self-contained breathing apparatus. Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters. Standard EN 469 - Protective clothing for firefighters. Standard - EN 659: Protective gloves for firefighters. Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.

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Specific methods	: If leaking do not spray water onto container. Water surrounding area (from protected position) to contain fire, Use fire control measures appropriate for the surrounding fire. Exposure to fire and heat radiation may cause gas receptacles to rupture. Cool endangered receptacles with water spray jet from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems, If possible, stop flow of product, Use water spray or fog to knock down fire fumes if possible, Move containers away from the fire area if this can be done without risk.
EAC code	: 2T

### SECTION 6: Accidental release measures

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

##### 6.1.1. For non-emergency personnel

Emergency procedures	: Act in accordance with local emergency plan. Try to stop release. Evacuate area. Ensure adequate air ventilation. Use protective clothing. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous. Stay upwind. See section 8 of the SDS for more information on personal protective equipment.
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##### 6.1.2. For emergency responders

Emergency procedures	: Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. Oxygen detectors should be used when asphyxiating gases may be released. See section 5.3 of the SDS for more information.
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#### 6.2. Environmental precautions

Try to stop release. Liquid spillages can cause embrittlement of structural materials.

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

Methods and material for containment and cleaning up	: Ventilate area.
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### SECTION 7: Handling and storage

#### 7.1. Precautions for safe handling

Safe handling of the gas receptacle	: Refer to supplier's container handling instructions. Do not allow backfeed into the container. Protect containers from physical damage; do not drag, roll, slide or drop. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use. If user experiences any difficulty operating valve discontinue use and contact supplier. Never attempt to repair or modify container valves or safety relief devices. Damaged valves should be reported immediately to the supplier. Keep container valve outlets clean and free from contaminants particularly oil and water. Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to transfer gases from one cylinder/container to another. Never use direct flame or electrical heating devices to raise the pressure of a container. Do not remove or deface labels provided by the supplier for the identification of the content of the container. Suck back of water into the container must be prevented. Open valve slowly to avoid pressure shock.
Safe use of the product	: Containers, which contain or have contained flammable or explosive substances, must not be inerted with liquid carbon dioxide. Potential production of solid CO <sub>2</sub> particles must be ruled out. In order to rule out potential electrostatic discharge production, the system must be adequately grounded. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt. Do not smoke while handling product. Avoid suck back of water, acid and alkalis. Only experienced and properly instructed persons should handle gases under pressure. Ensure the complete gas system was (or is regularly) checked for leaks before use. The product must be handled in accordance with good industrial hygiene and safety procedures. Consider pressure relief device(s) in gas installations. Do not breathe gas. Avoid release of product into work area. Be aware of the risk of formation of static electricity with the use of CO <sub>2</sub> extinguishers. Do not use them in places where a flammable atmosphere may be present.

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### 7.2. Conditions for safe storage, including any incompatibilities

Conditions for safe storage, including any incompatibilities

: For more guidance on the safe storage of refrigerated CO<sub>2</sub>, refer to EIGA Doc.66 "Refrigerated CO<sub>2</sub> storage at users' premises", downloadable at <http://www.eiga.eu>. and consult your supplier. Observe all regulations and local requirements regarding storage of containers. Containers should not be stored in conditions likely to encourage corrosion. Container valve guards or caps should be in place. Containers should be stored in the vertical position and properly secured to prevent them from falling over. Stored containers should be periodically checked for general condition and leakage. Keep container below 50°C in a well ventilated place. Store containers in location free from fire risk and away from sources of heat and ignition. Keep away from combustible materials.

## SECTION 8: Exposure controls and personal protection

### 8.1. Control parameters

Carbon dioxide (refrigerated) (124-38-9)	
<b>Germany - Occupational Exposure Limits (TRGS 900)</b>	
Local name	Kohlenstoffdioxid
AGW (OEL TWA) [1]	9100 mg/m <sup>3</sup>
AGW (OEL TWA) [2]	5000 ppm
Remark	DFG - Senatskommission zur Prüfung gesundheitsschädlicher Arbeitsstoffe der DFG (MAK-Kommission); EU - Europäische Union (Von der EU wurde ein Luftgrenzwert festgelegt: Abweichungen bei Wert und Spitzenbegrenzung sind möglich)
Regulatory reference	TRGS900
<b>United Kingdom - Occupational Exposure Limits</b>	
Local name	Carbon dioxide
WEL TWA (OEL TWA) [1]	9150 mg/m <sup>3</sup>
WEL TWA (OEL TWA) [2]	5000 ppm
WEL STEL (OEL STEL)	27400 mg/m <sup>3</sup>
WEL STEL (OEL STEL) [ppm]	15000 ppm
Regulatory reference	EH40/2005 (Fourth edition, 2020). HSE
<b>USA - ACGIH - Occupational Exposure Limits</b>	
Local name	Carbon dioxide
ACGIH OEL TWA [ppm]	5000 ppm
ACGIH OEL STEL [ppm]	30000 ppm
Remark (ACGIH)	TLV® Basis: Asphyxia
Regulatory reference	ACGIH 2023

### **Exposure limit values for the other components**

No additional information available

#### 8.1.1 Biological monitoring

No additional information available

### 8.2. Appropriate engineering controls

Appropriate engineering controls

: CO<sub>2</sub> detectors should be used when CO<sub>2</sub> may be released. Provide adequate general and local exhaust ventilation. Oxygen detectors should be used when asphyxiating gases may be released. Systems under pressure should be regularly checked for leakages. Ensure exposure is below occupational exposure limits (where available). Consider the use of a work permit system e.g. for maintenance activities.

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### 8.3. Individual protection measures, such as PPE

#### Hand protection:

Wear working gloves when handling gas containers. Standard EN 388 - Protective gloves against mechanical risks, performance level 1 or higher.  
Wear cold insulating gloves when transfilling or breaking transfer connections. Standard EN 511 - Cold insulating gloves.

#### Eye protection:

Wear goggles and a face shield when transfilling or breaking transfer connections. Standard EN 166 - Personal eye-protection - specifications

#### Respiratory protection:

Self contained breathing apparatus (SCBA) or positive pressure airline with mask are to be used in oxygen-deficient atmospheres. Self contained breathing apparatus is recommended, where unknown exposure may be expected, e.g. during maintenance activities on installation systems. Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask. Consult respiratory device supplier's product information for the selection of the appropriate device.

#### Personal protective equipment symbol(s):



Thermal hazard protection

: None in addition to the above sections.

Environmental exposure controls

: None necessary.

## SECTION 9: Physical and chemical properties

Physical state	: Gas
Appearance	: No data available
Colour	: Colourless.
Odour	: Odourless.
Odour threshold	: Odour threshold is subjective and inadequate to warn of overexposure.
pH	: Not applicable for gases and gas mixtures.
Melting point	: -78.5 °C Melting point at normal conditions does not exist. At atmospheric pressure solid carbon dioxide sublimates into gaseous carbon dioxide at -78.5°C
Freezing point	: No data available
Boiling point	: -56.6 °C
Flash point	: Not applicable for gases and gas mixtures.
Evaporation rate	: No data available
Flammability (solid, gas)	: Non flammable.
Explosive limits	: Upper explosion limit: Not applicable. Lower explosion limit: Not applicable.
Vapour pressure	: Vapour pressure: 57.3 bar(a) Vapour pressure at 50°C: No reliable data available.
Relative vapour density at 20°C	: Not applicable.
Relative density	: 0.82 Relative gas density: 1.52
Solubility	: Water: 2000 mg/l
Partition coefficient n-octanol/water (Log Pow)	: No data available
Partition coefficient n-octanol/water (Log Kow)	: 0.83
Critical temperature	: 31 °C
Auto-ignition temperature	: Non flammable.
Decomposition temperature	: Not applicable.
Viscosity, kinematic	: Not applicable for gases and gas mixtures.
Viscosity, dynamic	: No reliable data available.
Density	: Not applicable for gases and gas mixtures.
Critical pressure	: 7375 kPa
Molecular mass	: 44 g/mol

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Oxidising properties : No oxidising properties.  
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 : Avoid moisture in installation systems.  
Incompatible materials : Materials such as carbon steel, low alloy carbon steel and plastic become brittle at low temperatures and are subject to failure. Use appropriate materials compatible with the cryogenic conditions present in refrigerated liquefied gas systems, For additional information on compatibility refer to ISO 11114.  
Hazardous decomposition products : None.

### SECTION 11: Toxicological information

#### 11.1. Information on toxicological effects

Acute toxicity (oral) : Not classified  
Acute toxicity (dermal) : Not classified  
Acute toxicity (inhalation) : Not classified  
Skin corrosion or irritation : Not classified  
pH: Not applicable for gases and gas mixtures.  
Serious eye damage or eye irritation : Not classified  
Respiratory sensitization : Not classified  
Skin sensitization : Not classified  
Germ cell mutagenicity : Not classified  
Carcinogenicity : Not classified  
Reproductive toxicity : Not classified  
Specific target organ toxicity (STOT) – single exposure : Not classified  
Specific target organ toxicity (STOT) – repeated exposure : Not classified  
Aspiration hazard : Not classified

Carbon dioxide (refrigerated) (124-38-9)	
Viscosity, kinematic	Not applicable for gases and gas mixtures.

Other information : Unlike simple asphyxiants, carbon dioxide has the ability to cause death even when normal oxygen levels (20-21%) are maintained. 5% CO<sub>2</sub> has been found to act synergistically to increase the toxicity of certain other gases (CO, NO<sub>2</sub>). CO<sub>2</sub> has been shown to enhance the production of carboxy- or met-hemoglobin by these gases possibly due to carbon dioxide's stimulatory effects on the respiratory and circulatory systems. For more information, see 'EIGA Safety Info 24: Carbon Dioxide, Physiological Hazards' at [www.eiga.eu](http://www.eiga.eu). The substance/mixture has no endocrine disrupting properties.

### SECTION 12: Ecological information

#### 12.1. Ecotoxicity

Ecology - general : No ecological damage caused by this product.  
Hazardous to the aquatic environment, short-term (acute) : Not classified  
Hazardous to the aquatic environment, long-term (chronic) : Not classified

Carbon dioxide (refrigerated) (124-38-9)	
Partition coefficient n-octanol/water (Log Kow)	0.83

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### 12.2. Persistence and degradability

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

Persistence and degradability	No ecological damage caused by this product.
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### 12.3. Bioaccumulative potential

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

Partition coefficient n-octanol/water (Log Kow)	0.83
Bioaccumulative potential	No ecological damage caused by this product.

### 12.4. Mobility in soil

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

Mobility in soil	No additional information available
Partition coefficient n-octanol/water (Log Kow)	0.83
Ecology - soil	No ecological damage caused by this product.

### 12.5. Other adverse effects

Ozone	: Not classified
Effect on global warming	: When discharged in large quantities may contribute to the greenhouse effect, Contains greenhouse gas(es).
GWP 100 years	: 1
Effect on the ozone layer	: No effect on the ozone layer.
Other adverse effects	: Can cause frost damage to vegetation.

## SECTION 13: Disposal information

### 13.1. Disposal methods

Waste treatment methods	: Discharge to atmosphere in large quantities should be avoided. May be vented to atmosphere in a well ventilated place. Do not discharge into any place where its accumulation could be dangerous. Return unused product in original container to supplier.
Additional information	: External treatment and disposal of waste should comply with applicable local and/or national regulations.

## SECTION 14: Transportation information

### 14.1. UN number

UN-No. (UN RTDG)	: 2187
UN-No. (IMDG)	: 2187
UN-No. (IATA)	: 2187

### 14.2. UN proper shipping name

Proper Shipping Name (UN RTDG)	: CARBON DIOXIDE, REFRIGERATED LIQUID
Proper Shipping Name (IMDG)	: CARBON DIOXIDE, REFRIGERATED LIQUID
Proper Shipping Name (IATA)	: Carbon dioxide, refrigerated liquid

### 14.3. Transport hazard class(es)

#### UN RTDG

Transport hazard class(es) (UN RTDG)	: 2.2
Danger labels (UN RTDG)	: 2.2
	:



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### IMDG

Transport hazard class(es) (IMDG) : 2.2  
Danger labels (IMDG) : 2.2



### IATA

Transport hazard class(es) (IATA) : 2.2  
Danger labels (IATA) : 2.2



### 14.4. Packing Group, if applicable

Packing group (UN RTDG) : Not applicable  
Packing group (IMDG) : Not applicable  
Packing group (IATA) : Not applicable

### 14.5. Environmental hazards

Dangerous for the environment : No  
Marine pollutant : No  
Other information : No supplementary information available

### 14.6. Transport in bulk (according to Annex II of MARPOL 73/78 and the IBC Code)

Special transport precautions : Avoid transport on vehicles where the load space is not separated from the driver's compartment, Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency, Before transporting product containers: - Ensure there is adequate ventilation, - Ensure that containers are firmly secured, - Ensure valve is closed and not leaking, - Ensure valve outlet cap nut or plug (where provided) is correctly fitted, - Ensure valve protection device (where provided) is correctly fitted.

### UN RTDG

Limited quantities (UN RTDG) : 120 ml  
Excepted quantities (UN RTDG) : E1  
Packing instruction (UN RTDG) : P203  
Portable tank and bulk container special instructions (UN RTDG) : T75  
Portable tank and bulk container special provisions (UN RTDG) : TP5

### IMDG

Limited quantities (IMDG) : 120 ml  
Excepted quantities (IMDG) : E1  
Packing instructions (IMDG) : P203  
Tank instructions (IMDG) : T75  
Tank special provisions (IMDG) : TP5  
EmS-No. (Fire) : F-C - FIRE SCHEDULE Charlie - NON-FLAMMABLE GASES  
EmS-No. (Spillage) : S-V - SPILLAGE SCHEDULE Victor - GASES (NON-FLAMMABLE, NON-TOXIC)  
Stowage category (IMDG) : D  
Properties and observations (IMDG) : Non-flammable, liquefied gas, colourless and odourless. Heavier than air (1.5). Cannot remain in the liquid state above 31°C.

### IATA

PCA Excepted quantities (IATA) : E1  
PCA Limited quantities (IATA) : Forbidden  
PCA limited quantity max net quantity (IATA) : Forbidden  
PCA packing instructions (IATA) : 202  
PCA max net quantity (IATA) : 50kg



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CAO packing instructions (IATA) : 202  
CAO max net quantity (IATA) : 500kg  
ERG code (IATA) : 2L

### 14.7. Special precautions for user

IBC code : Not applicable.

### 14.8. Hazchem or Emergency Action Code

EAC code : 2T.

## SECTION 15: Regulatory information

### 15.1. Safety, health, and environmental regulations specific for the hazardous chemical in question

Carbon dioxide (refrigerated) (124-38-9)	
EHS Notification and Registration Scheme	Not applicable
EHS Notification and Registration Scheme	Not applicable
Environmental Quality (Chlorofluorocarbons Prohibition) Order 1993	
Environmental Quality (Industrial Effluent) Regulations 2009	
Environmental Quality (Scheduled Wastes) Regulations 2007	
Control of Industrial Major Accident Hazards Regulations 1996	
Prohibition of Use of Substance Order 1999	
Use and Standards of Exposure of Chemical Hazardous to Health Regulations 2000	
Chemical Weapons Convention Act	
Corrosive and Explosive Substances and Offensive Weapons Act	
Dangerous Drugs Act	
Pesticides Act	
Petroleum (Safety Measures) Act	
Poisons Act 1952	
Poisons (Psychotropic Substances) Regulations 1989	

### 15.2. International agreements

No additional information available

## SECTION 16: Other information

Version : 1.0  
Issue date : 3/26/2015  
Revision date : 28/12/2023  
Supersedes : 26/03/2015

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### Abbreviations and acronyms

: ATE - Acute Toxicity Estimate  
CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008  
REACH - Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (EC) No 1907/2006  
EINECS - European Inventory of Existing Commercial Chemical Substances  
CAS# - Chemical Abstract Service number  
PPE - Personal Protection Equipment  
LC50 - Lethal Concentration to 50 % of a test population  
RMM - Risk Management Measures  
PBT - Persistent, Bioaccumulative and Toxic  
vPvB - Very Persistent and Very Bioaccumulative  
STOT- SE : Specific Target Organ Toxicity - Single Exposure  
CSA - Chemical Safety Assessment  
EN - European Standard  
UN - United Nations  
ADR - European Agreement concerning the International Carriage of Dangerous Goods by Road  
IATA - International Air Transport Association  
IMDG code - International Maritime Dangerous Goods  
RID - Regulations concerning the International Carriage of Dangerous Goods by Rail  
WGK - Water Hazard Class  
STOT - RE : Specific Target Organ Toxicity - Repeated Exposure  
UFI : Unique Formula Identifier

: The hazard of asphyxiation is often overlooked and must be stressed during operator training. For more guidance, refer to EIGA SL 01 "Dangers of Asphyxiation", downloadable at <http://www.eiga.eu>.

: Classification in accordance with the procedures and calculation methods of Regulation (EC) 1272/2008 (CLP). Key literature references and sources of data are maintained in EIGA doc 169 : 'Classification and Labelling Guide', downloadable at <http://www.Eiga.eu> .

### Training advice

### Other information

Safety Data Sheet (SDS), Malaysia\_AL

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.