



## 1. IDENTIFICATION OF THE SUBSTANCE AND OF THE COMPANY/UNDERTAKING

### 1.1. Product identifier

Product Name: Carbon dioxide (CO<sub>2</sub>), liquefied/ compressed  
Chemical name: Carbon dioxide  
CAS / EC no 124-38-9 / 204-696-9  
REACH: CO<sub>2</sub> is exempted from REACH registration (according to REACH Annex IV - V)  
CLP index no.: -- (CO<sub>2</sub> not listed in CLP Annex V, no harmonised classification)

### 1.2. Relevant identified uses of the substance or mixture and uses advised against

Cooling agent, food industry, fire extinguishers or green houses.

### 1.3. Details of the supplier of the safety data sheet

NGGM (Nederlandse Groen Gas Maatschappij B.V.; Dutch Green Gas Company)  
P.O. Box 320 (NL-2700 AH Zoetermeer, The Netherlands)  
Phone number: (+31) (0) 79 361 3668  
Email: office@nggm.nl, website: www.nggm.nl

### 1.4. Emergency telephone number

UK: **+44 (0)844 892 0111** 24 hours per day: **Only available for medical professionals in the UK**  
Poison information Service UK  
US: **+1-800-222-1222** 24 hours per day (everyone)  
American Association of Poison Control Centers  
Others: **+31 (0)79 361 3668** 24 hours per day (NGGM)

## 2. HAZARDS IDENTIFICATION

### 2.1. Classification of the substance

#### Classification of the substance in accordance with EC/1272/2008 (CLP: EU-GHS)

Refrigerated liquefied gas: H281: Contains refrigerated gas; may cause cryogenic burns or injury

#### Classification of the substance in accordance with 67/548/EG (dangerous substance directive: DSD)

none

### 2.2. Label elements



**WARNING** H281: Contains refrigerated gas; may cause cryogenic burns or injury

#### Precautionary statements:

P282: Wear cold insulating gloves/face shield/eye protection.  
P336: Thaw frosted parts with lukewarm water. Do not rub affected area.  
P315: Get immediate medical advice/attention.  
P403: Store in a well-ventilated place.

### 2.3. Other hazards

The product is stored and transported at – 50 °C at 10 barg. Vapours may exclude oxygen and cause dizziness or asphyxiation (suffocation) without warning. The gas is heavier than air and may accumulate in low ceiling spaces causing deficiency of oxygen. Build up of static electricity can occur at fast flow rates and may ignite any explosive mixtures present. Free-flowing liquid condenses to form extremely cold dry ice. Contact with gas, dry ice or liquefied gas may cause burns, severe injury and/or frostbite.

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1. Substances

CAS. no.	Substance name	%	EC. no.	Classification CLP	Classification DSD
124-38-9	Carbon dioxide	99.5 - 100%	204-696-9	ref. liquefied gas	none
74-82-8	Methane	0 – 0.5%	200-812-7	Flam. Gas cat. 1 ref. liquefied gas	F+; R12
7727-37-9	Nitrogen	0 – 0.5%	231-783-9	ref. liquefied gas	none
7782-44-7	Oxygen	0 – 0.5%	231-956-9	Oxidising gas ref. liquefied gas	O; R8

## 4. FIRST AID MEASURES

### 4.1. Description of first aid measures

<b>Inhalation</b>	Move to fresh air. Keep patient warm and at rest. Oxygen or artificial respiration if needed. Seek medical advice immediately.
<b>Ingestion</b>	Unlikely (gas)
<b>Skin contact</b>	Thaw frosted parts with lukewarm water. Do not rub affected area. Do not remove clothing. Seek medical advice immediately.
<b>Eye contact</b>	Rinse immediately with plenty of water for at least 15 minutes. Keep on rinsing until medical assistance is obtained.
<b>Information for medical personnel</b>	No specific treatment. Treat symptomatic.

### 4.2. Most important symptoms and effects, both acute and delayed

<b>Inhalation</b>	dizziness, unconsciousness, suffocation
<b>Ingestion</b>	not likely / no symptoms known
<b>Skin contact</b>	frost bites are most likely symptoms
<b>Eye contact</b>	frost bites are most likely symptoms

### 4.3. Indication of any immediate medical attention and special treatment needed

No further specific information.



## **5. FIREFIGHTING MEASURES**

### **5.1. Extinguishing media**

Use extinguishing media suitable against surrounding fire or the cause of fire: water (spray), powder, foam, carbon dioxide.

### **5.2. Special hazards arising from the substance or mixture**

Although CO<sub>2</sub> is not flammable or combustible, container can explode in heat or flames

### **5.3. Advice for fire-fighters**

Wear full (thermal) protective clothing and self-contained breathing apparatus with a full face piece operated in pressure-demand or other positive pressure mode. Keep people away from and upwind of spill or leak. Cool containers or tanks with water spray from a safe distance or protected area. Do not direct water at spill or source of leak. Withdraw immediately in case of rising sound from venting safety devices or discolouration of tank.

## **6. ACCIDENTAL RELEASE MEASURES**

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

Take care of personal protection (see chapter 8). No action may be taken if a chance of personal injury exists or in case of insufficient training. Procedure:

- Immediately evacuate people in a radius of 100 meter, keep people upwind, isolate the surroundings. Keep out of low areas. Provide ventilation. Avoid contact and inhalation.
- If possible without personal risk: attempt to stop leakage or turn leaking cylinder with the leak up to prevent escape of gas in liquid state, or move containers from a fire area.
- Withdraw immediately in case of rising sound from venting safety devices or discolouration of tank. ALWAYS stay away from tanks engulfed in fire.

### **6.2. Environmental precautions**

If possible without personal risk: attempt to stop or minimise the emission (green house gas). No further environmental precautions necessary (no other environmental risks expected). Contact the competent authority in case of discharging collected fire-water run-off to sewer or surface water. The run-off may be acidic due to the formation of carbonic acid. Consider neutralising acidic run-off or water with an alkali before discharge.

### **6.3. Methods and material for containment and cleaning up**

Liquefied or solid CO<sub>2</sub> will evaporate or sublimate rapidly and entirely. Ensure adequate ventilation.



## 7. Handling and storage

### 7.1. Precautions for safe handling

Take care of personal protection and hygienic measures (see chapter 8). Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Recommended are closed systems for handling, process and storage. Ensure adequate ventilation. Prevent leaks by checking valves, pipelines and joints regularly. See par. 15 for specific regulations regarding safety of pressure equipment and vessels.

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

Store in accordance with the local regulations, in a separate, approved area. Keep containers or cylinders tightly closed in a cool, well-ventilated place. Keep locked up or in an area accessible only to qualified or authorised persons. Do not store together with incompatible materials (see par. 10.5) and self igniting substances. Keep all heat sources away. Storage tanks have to be protected against collision by means of concrete or steel piles. Storage tanks need to have a pressure relief valve ending up at a minimum height of 2.50 meters.

## 8. Exposure controls/personal protection

### 8.1. Control parameters

Official occupational exposure limits (OEL) for CO<sub>2</sub>:

- UK: limit value (8-hour time weighted average): 5000 ppm/ 9150 mg/m<sup>3</sup>  
Short term limit value (15 min.): 15000 ppm/ 27400 mg/m<sup>3</sup>
- US: limit value (8-hour time weighted average): 5000 ppm/ 9000 mg/m<sup>3</sup> (OSHA)
- NL: limit value (8-hour time weighted average): 9000 mg/m<sup>3</sup>.

CO<sub>2</sub> is an asphyxiant: on loss of containment the gas can cause suffocation by lowering the oxygen content of the air (beneath 17 – 18 % v/v) in confined areas. Because CO<sub>2</sub> is also odourless it is possible to become unconscious and suffocate by inhalation of the gas, without realising it's presence.

### 8.2. Exposure controls

Control of professional exposure	Use in a closed system, provide adequate ventilation. Prevent leaks by checking valves, pipelines and joints regularly. Consider oxygen level alarms and automatic emergency ventilation in confined areas where carbon dioxide could be (accidentally) released.
Hygienic measures	Avoid and prevent all spillages and releases, contact and exposure.
Protection of the respiratory system	Wear self-contained breathing apparatus in case of insufficient ventilation or emergency situations. Note that simple air-purifying respirators or dust masks do not protect from asphyxiation in an oxygen-deficient atmosphere.
Protections of the hands and skin	Wear suitable gloves: Cold-insulating gloves (e.g. nitrile rubber). Wear suitable thermal protective clothing or over-all and rubber boots.
Protection of the eyes	Wear tightly fitting safety goggles. Face-shield

## 9. PHYSICAL AND CHEMICAL PROPERTIES

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

Appearance	CO <sub>2</sub> is a colourless, odourless gas at standard temperature and pressure. It is provided in the liquefied form at low temperature and elevated pressure.
odour	No odour
pH	In saturated solution approx. 3.5
Melting point	Approx. - 56.6 °C (triple point)
Boiling point	Approx. - 78.5°C (sublimation)
Flash point	none
Evaporation rate	CO <sub>2</sub> is a gas, liquid and solid CO <sub>2</sub> evaporates, or sublimates rapidly
Flammability	not flammable (not combustible)
Explosion limits	none
Vapour pressure	57300 hPa at 20°C.
Vapour density	1,977 g/m <sup>3</sup> (0°C)
Relative density	1.527 (air = 1)
Water solubility	88 ml carbon dioxide / 100 ml water at 20°C (1.61 g/l at 20°C)
Partition coefficient: n-octanol-water	Log Kow = 0.83
Auto-ignition temperature	not ignitable
Decomposition temperature	> 300 °C
Viscosity	Not known
Oxidising properties	No oxidising properties
Explosive properties	No explosive properties

## 10. STABILITY AND REACTIVITY

### 10.1. Reactivity

The product is not reactive

### 10.2. Chemical stability

The product is stable

### 10.3. Possibility of hazardous reactions

Within normal storage circumstances and upon normal usage no dangerous reactions will occur.

### 10.4. Conditions to avoid



Avoid (uncontrolled) contact with incompatible materials. Heating of containers or cylinders.

#### **10.5. Incompatible materials**

Dusts of various metals, such as magnesium, zirconium, titanium, aluminium, chromium & manganese are ignitable and explosive when suspended in carbon dioxide. Forms carbonic acid in water.

#### **10.6. Hazardous decomposition products**

The substance decomposes on heating above 2000°C producing toxic carbon monoxide

### **11. TOXICOLOGICAL INFORMATION**

#### **11.1. Information on toxicological effects**

##### **Possible acute effects on health**

Not acute toxic: LC50 (inhalation) > 20,000 ppm

##### Irritation/ Corrosion

Skin contact: not irritant (liquefied gas can cause frost bites)

Eye contact: not irritant

##### **Possible chronic effects on health**

Sensibility No sensitizing effects known

Carcinogenicity: No carcinogenic activity known

Mutagenicity: No genotoxic activity known.

Reproductive toxicity No reproductive toxicity known

Specific target organ toxicity No information available

Aspiration hazard No information available

### **12. ECOLOGICAL INFORMATION**

#### **12.1. Toxicity**

LC/ EC/ IC 50 > 10 < 100 mg/l (not aqua toxic)

#### **12.2. Persistence and degradability**

Readily biodegradable (in water)

#### **12.3. Bioaccumulative potential**

A low bioaccumulation is to be expected (BCF < 10)

#### **12.4. Mobility in soil**



No exposure to soil expected, CO<sub>2</sub> is a gas (in the liquid or solid state it will evaporate or sublimate rapidly)

### 12.5. Results of PBT (Persistence, Bioaccumulation and Toxicity) assessment

The product does not meet the criteria for PBT or vPvB.

### 12.6. Other adverse effects

None known

## 13. DISPOSAL CONSIDERATIONS

### 13.1. Waste treatment methods

No waste is expected to be produced. Containers and cylinders (whether or not empty) could be returned to the supplier or should be removed by a licensed waste disposal company in accordance with local legislation.

## 14. TRANSPORT INFORMATION

Transport legislation	UN-number	Shipping name	Class/ packing group
ADR/ ADN/ RID/ DOT IMDG/ IATA	2187	CARBON DIOXIDE, REFRIGERATED LIQUID	2.2 (2A)

The CO<sub>2</sub> is stored and transported at - 50°C at 10 barg. Loading and unloading installations have to be protected against collision by means of concrete or steel piles. During loading and unloading the following Personal Protective Equipment (PPE's) have to be used: insulated gloves, overall, safety glasses and face shield. Before transportation of this product, ensure:

- compliance with transport regulations and proper training of all involved personnel
- that cylinder valves are closed and not leaking and protection devices are correctly fitted
- that cylinders are firmly secured and adequate ventilation is provided.

## 15. REGULATORY INFORMATION

### 15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

Carbon dioxide is a green house gas. National or local provisions may be applicable regarding emissions to air and occupational safety. Check the competent national or local authority for more information.

Specific European legislation: The Pressure Equipment Directive (PED)

Specific US legislation and standards:

- OSHA regulations such as: standards 29 CFR: 1910.101 - Compressed gases (general requirements)
- The ASME Code or API Standard 620 (design and construction of pressure vessels).

US NFPA 704 Rating:

- Health Hazard Rating: 1
- Fire Hazard Rating: 0
- Reactivity Hazard Rating: 0

NIOSH, Registry of Toxic Effects (RTECS) Identification Number: FF6400000

### **15.2. Chemical safety assessment**

CO<sub>2</sub> is exempted from REACH registration (according to REACH Annex IV). A chemical safety assessment as required by REACH is therefore not mandatory and not available.

## **16. OTHER INFORMATION**

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