Safety Data Sheet according to Regulation (EG) No. 1907/2006

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SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Trade name:	Carbon dioxide
Chemical description :	Carbon dioxide CAS-No.: 124-38-9 EC-No.: 204-696-9 EC Index-No.: ---
Registration-No.:	Listed in Annex IV / V REACH, exempted from registration.
Chemical formula:	CO2

1.2. Relevant identified uses of the substance or mixture

Relevant identified uses:	Industrial and professional. Perform risk assessment prior to use. Test gas/Calibration gas. Laboratory use. Food applications. Contact supplier for more information on uses.

1.3. Details of the supplier of the safety data sheet

Company identification:	NTG EUROPE GmbH Europaplatz 2 44269 Dortmund / Germany +49 231 567 690 71 www.ntg-europe.de sds@ntg-europe.de

1.4. Emergency telephone number

Emergency telephone number:	+49 30 306 867 00 (24 / 7)

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SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Physical hazards	Gases under pressure: Liquefied gas	H280

2.2. Label elements

Labelling according to Regulation (EC) No. 1272/2008 [CLP]

Hazard pictograms (CLP):



GHS04

Signal word (CLP): Warning

Hazard statements (CLP): H280 - Contains gas under pressure; may explode if heated.

Precautionary statements (CLP)
- Storage: P403 - Store in a well-ventilated place.

2.3. Other hazards

Asphyxiant in high concentrations.
Contact with liquid may cause cold burns/frostbite.
In high concentrations CO2 causes rapid circulatory insufficiency even at normal levels of oxygen concentration.
Symptoms are headache, nausea and vomiting, which may lead to unconsciousness and death.

SECTION 3: Composition/information on ingredients

3.1. Substances

Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP]
Carbon dioxide	(CAS-No.) 124-38-9 (EC-No.) 204-696-9 (EC Index-No.) --- (Registration-No.) *1	99,5	Press. Gas (Liq.), H280

Contains no other components or impurities which will influence the classification of the product.
**1: Listed in Annex IV / V REACH, exempted from registration.*

3.2. Mixtures

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

- 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.
- Skin contact:	In case of frostbite spray with water for at least 15 minutes. Apply a sterile dressing. Obtain medical assistance.
- Eye contact:	Immediately flush eyes thoroughly with water for at least 15 minutes.
- Ingestion:	Ingestion is not considered a potential route of exposure.

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

In high concentrations may cause asphyxiation.
Symptoms may include loss of mobility/consciousness.
Victim may not be aware of asphyxiation.
Low concentrations of CO2 cause increased respiration and headache.
Refer to section 11.

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

None

SECTION 5: Firefighting measures

5.1. Extinguishing media

- Suitable extinguishing media:	Water spray or fog.
- Unsuitable extinguishing media:	Do not use water jet to extinguish.

5.2. Special hazards arising from the substance or mixture

Specific hazards: Exposure to fire may cause containers to rupture/explode.

5.3. Advice for firefighters

Specific methods:	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.
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 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask. Standard EN 469 - Protective clothing for firefighters. Standard - EN 659: Protective gloves for firefighters.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Try to stop release.
Evacuate area.
Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe.
Ensure adequate air ventilation.
Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.
Act in accordance with local emergency plan.
Stay upwind.
Oxygen detectors should be used when asphyxiating gases may be released.

6.2. Environmental precautions: Try to stop release.

6.3. Methods and material for containment and cleaning up:

Keep area evacuated and free from ignition sources until any spilled liquid has evaporated (ground free from frost).

6.4. Reference to other sections: See also sections 8 and 13.

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SECTION 7: Handling and storage

7.1. Precautions for safe handling:

Safe use of the product:	The product must be handled in accordance with good industrial hygiene and safety procedures. Only experienced and properly instructed persons should handle gases under pressure. Consider pressure relief device(s) in gas installations. Ensure the complete gas system was (or is regularly) checked for leaks before use. Do not smoke while handling product. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt. Avoid suck back of water, acid and alkalis. Do not breathe gas. Avoid release of product into atmosphere. Containers, which contain or have contained flammable or explosive substances must not be inerted with liquid carbon dioxide. Potential production of solid CO2 particles must be ruled out. In order to rule out potential electrostatic discharge production, the system must be adequately grounded.
Safe handling of the gas receptacle:	Refer to supplier's container handling instructions. Do not allow backfeed into the container. Protect cylinders from physical damage; do not drag, roll, slide or drop. 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 the engraving provided by the supplier for the identification of the cylinder contents. Suck back of water into the container must be prevented.

7.2. Conditions for safe storage, including any incompatibilities:

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 40°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.

7.3. Specific end use(s): None

SECTION 8: Exposure controls/personal protection

8.1. Control parameters:

Carbon dioxide (124-38-9)		
OEL: Occupational Exposure Limits		
EU	TWA IOELV (EU) 8 h [mg/m³]	9000 mg/m³
	TWA IOELV (EU) 8 h [ppm]	5000 ppm
United Kingdom	WEL - LTEL - UK [mg/m³]	9150 mg/m³
	WEL - LTEL - UK [ppm]	5000 ppm
	WEL - STEL - UK [mg/m³]	27400 mg/m³
	WEL - STEL - UK [ppm]	15000 ppm
Ireland	OEL (IE)-(8-hour reference period) [mg/m3]	9000 mg/m³
	OEL (IE)-(8-hour reference period) [ppm]	5000 ppm
	OEL (IE)-(15min reference period) [mg/m3]	27000 mg/m³
	OEL (IE)-(15min reference period) [ppm]	15000 ppm
	Notes (IE)	IOELV

DNEL (Derived-No Effect Level): None available
PNEC (Predicted No-Effect Concentration): None available

8.2. Exposure controls:

8.2.1. Appropriate engineering controls:

Provide adequate general and local exhaust ventilation.
Systems under pressure should be regularly checked for leakages.
Ensure exposure is below occupational exposure limits (where available).
Oxygen detectors should be used when asphyxiating gases may be released.
Consider the use of a work permit system e.g. for maintenance activities.
CO2 detectors should be used when CO2 may be released.

8.2.2. Individual protection measures, e.g. personal protective equipment:

A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk.
The following recommendations should be considered:
PPE compliant to the recommended EN/ISO standards should be selected.

• Eye/face protection: Wear goggles when transfilling or breaking transfer connections.
Standard EN 166 - Personal eye-protection - specifications.

• Skin protection
- Hand protection: Wear working gloves when handling gas containers.
Standard EN 388 - Protective gloves against mechanical risk.
Wear cold insulating gloves when transfilling or breaking transfer connections.
Standard EN 511 - Cold insulating gloves.
- Other: Wear safety shoes while handling containers.
Standard EN ISO 20345 - Personal protective equipment - Safety footwear.

• Respiratory protection: Gas filters may be used if all surrounding conditions e.g. type and concentration of the contaminant(s) and duration of use are known.
Use gas filters with full face mask, where exposure limits may be exceeded for a short-term period, e.g. connecting or disconnecting containers.
Consult respiratory device supplier´s product information for the selection of the appropriate device.
Gas filters do not protect against oxygen deficiency.
Self-contained breathing apparatus (SCBA) or positive pressure airline with mask are to be used in oxygen-deficient atmospheres.
Standard EN 14387 - Gas filter(s), combined filter(s) and standard EN136, full face masks.
Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.

• Thermal hazards: None in addition to the above sections.

8.2.3. Environmental exposure controls:

None necessary

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SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance

- **Physical state at 20°C / 101.3kPa:** Gas
- **Colour:** Colourless.

Odour:	Odourless. No odour warning properties.
Odour threshold:	Odour threshold is subjective and inadequate to warn of overexposure.
pH:	Not applicable for gases and gas mixtures.
Melting point / Freezing point:	-78,5 °C At atmospheric pressure dry ice sublimes into gaseous carbon dioxide.
Boiling point:	-56,6 °C
Flash point:	Not applicable for gases and gas mixtures.
Evaporation rate:	Not applicable for gases and gas mixtures.
Flammability (solid, gas):	Non-flammable.
Explosive limits:	Non-flammable.
Vapour pressure [20°C]:	57,3 bar(a)
Vapour pressure [50°C]:	Not applicable.
Vapour density:	Not applicable.
Relative density, liquid (water=1):	0,82
Relative density, gas (air=1):	1,52
Water solubility:	2000 mg/l Completely soluble.
Partition coefficient n-octanol/water (Log Kow):	0,83
Auto-ignition temperature:	Non-flammable.
Decomposition temperature:	Not applicable.
Viscosity:	No reliable data available.
Explosive properties:	Not applicable.
Oxidising properties:	Not applicable.

9.2. Other information

Molar mass:	44 g/mol
Critical temperature [°C]:	30 °C
Other data:	Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

SECTION 10: Stability and reactivity

10.1. Reactivity:	No reactivity hazard other than the effects described in sub-sections below.
10.2. Chemical stability:	Stable under normal conditions.
10.3. Possibility of hazardous reactions:	None.
10.4. Conditions to avoid:	Avoid moisture in installation systems.
10.5. Incompatible materials:	None. For additional information on compatibility refer to ISO 11114.
10.6. Hazardous decomposition products:	None.

SECTION 11: Toxicological information

11.1. Information on toxicological effects:

Acute toxicity:	Unlike simple asphyxiants, carbon dioxide has the ability to cause death even when normal oxygen levels (20-21%) are maintained. 5% CO2 has been found to act synergistically to increase the toxicity of certain other gases (CO, NO2). CO2 has been shown to enhance the production of carboxy- or methaemoglobin 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.
Skin corrosion/irritation:	No known effects from this product.
Serious eye damage/irritation:	No known effects from this product.
Respiratory or skin sensitisation:	No known effects from this product.
Germ cell mutagenicity:	No known effects from this product.
Carcinogenicity:	No known effects from this product.

Toxic for reproduction: Fertility:	No known effects from this product.
Toxic for reproduction: unborn child:	No known effects from this product.
STOT-single exposure:	No known effects from this product.
STOT-repeated exposure:	No known effects from this product.
Aspiration hazard:	Not applicable for gases and gas mixtures.

SECTION 12: Ecological information

12.1. Toxicity

Assessment:	No ecological damage caused by this product.
EC50 48h - Daphnia magna [mg/l]:	No data available.
EC50 72h - Algae [mg/l]:	No data available.
LC50 96 h - Fish [mg/l]:	No data available.

12.2. Persistence and degradability

Assessment:	No ecological damage caused by this product.

12.3. Bioaccumulative potential

Assessment:	No ecological damage caused by this product.

12.4. Mobility in soil

Assessment:	Because of its high volatility, the product is unlikely to cause Ground or water pollution. Partition into soil is unlikely.

12.5. Results of PBT and vPvB assessment

Assessment:	No data available. Not classified as PBT or vPvB.

12.6. Other adverse effects

Other adverse effects:	No known effects from this product.
Effect on the ozone layer:	None.
Global warming potential [CO2=1]:	1
Effect on global warming:	Contains greenhouse gas(es). When discharged in large quantities may contribute to the greenhouse effect.

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SECTION 13: Disposal considerations

13.1. Waste treatment methods:

May be vented to atmosphere in a well ventilated place.
Discharge to atmosphere in large quantities should be avoided.
Do not discharge into any place where its accumulation could be dangerous.
Return unused product in original cylinder to supplier.

List of hazardous waste codes (from Commission Decision 2000/532/EC as amended)

16 05 05: Gases in pressure containers other than those mentioned in 16 05 04.

13.2. Additional information:

External treatment and disposal of waste should comply with applicable local and/or national regulations.

SECTION 14: Transport information

14.1. UN-number:	**1013**	**2037**
14.2. UN proper shipping name: **Transport by road/rail (ADR/RID):**	CARBON DIOXIDE	RECEPTACLES, SMALL, CONTAINING GAS (GAS CATRIDGES)
Transport by air (ICAO-TI / IATA-DGR):	Carbon dioxide	
Transport by sea (IMDG):	CARBON DIOXIDE	RECEPTACLES, SMALL, CONTAINING GAS (GAS CATRIDGES)

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14.3. Transport hazard class(es):		
Labelling:	 2.2: Non-flammable, non-toxic gases.	 Limited Quantities
Transport by road/rail (ADR/RID)		
Class:	2	2
Classification code:	2A	5A
Hazard identification number:	20	
Tunnel Restriction:	C/E - Tank carriage: Passage forbidden through tunnels of category C, D and E. Other carriage: Passage forbidden through tunnels of category E	E – Passage forbidden through tunnels of category E
Transport by air (ICAO-TI / IATA-DGR) Class / Div. (Sub. risk(s)):	2.2	
Transport by sea (IMDG) Class / Div. (Sub. risk(s)):	2.2	2.2
Emergency Schedule (EmS) - Fire:	F-C	F-D
Emergency Schedule (EmS)-Spillage:	S-V	S-U
14.4. Packing group:		
Transport by road/rail (ADR/RID):	Not applicable	Not applicable
Transport by air (ICAO-TI / IATA-DGR):	Not applicable	Not applicable
Transport by sea (IMDG):	Not applicable	Not applicable

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14.5. Environmental hazards:		
Transport by road/rail (ADR/RID):	None.	None.
Transport by air (ICAO-TI / IATA-DGR):	None.	None.
Transport by sea (IMDG):	None.	None.
14.6. Special precautions for user:		
Packing Instruction(s)		
Transport by road/rail (ADR/RID):	P200	P003
Transport by air (ICAO-TI / IATA-DGR)		
Passenger and Cargo Aircraft:	200	
Cargo Aircraft only:	200	
Transport by sea (IMDG):	P200	P003

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.

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SECTION 15: Regulatory information

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

EU-Regulations

Restrictions on use: None.

Seveso Directive: 2012/18/EU (Seveso III): Not covered.

National regulations

National legislation: Ensure all national/local regulations are observed.

Water hazard class (WGK Germany): Not hazardous to water.

15.2. Chemical safety assessment: A CSA does not need to be carried out for this product.

SECTION 16: Other information

Indication of changes: Revised safety data sheet in accordance with commission regulation (EU) No 2015/830.

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

Training advice: 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.

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