

SAFETY DATA SHEET
(according to Regulation (EC) No 1907/2006 (REACH), ANNEX II)

**LIQUID CARBON DIOXIDE
FOR FOOD INDUSTRY**

Revision date: 01.03.2023 Version 1.0

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifier

Trade name:	Liquid carbon dioxide for food industry
Other names:	Carbonic acid anhydride, carbonic anhydride, carbon dioxide gas, carbon dioxide, low-temperature liquid carbon dioxide, carbon (IV) oxide, carbonic acid, food additive E-290
Name IUPAC/ international chemical name	Carbon dioxide
CAS number:	124-38-9
EINECS number:	204-696-9
Chemical formula:	CO ₂
INDEX number and name as listed in Annex VI of CLP:	-
REACH registration No.:	According to Annex IV of Regulation (EC) No. 1907/2006 (REACH) exempted from registration

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

Relevant identified uses:	Used in the food industry for the production of carbonated drinks, dry ice, for cooling, freezing and storage of food products in direct or indirect contact with it
Uses advised against:	-

1.3 Details of the supplier of the safety data sheet

Only Representative:	Zangas Hoch-und Tiefbau GmbH Himmelpfortgasse 13/9, 1010, Vienna, Austria Phone: +43 1 253 1073 www.zangasgroup.com E-mail: info@zangasgroup.com
Manufacturer:	PrJSC AZOT 72 Heroiv Kholodnoho Yaru str., 18028, Cherkasy, Ukraine Tel.: +38 (0472) 39-23-33 +38 (0472) 39-61-54 Website: http://www.azot.ck.ua E-mail: let@azot.ck.ua sale@azot.ck.ua
Contact details of the person responsible for this Safety Data Sheet:	PrJSC AZOT Department of quality management, standardization, certification and REACH compliance Dmytro Yalovoi Tel.: +38(0472)39-64-20 E-mail: onr@azot.ck.ua

1.4 Emergency telephone number

Emergency phone number:	Tel.: + 43 1 274 16 366 Working hours: 9-18 (CET) Languages: German, English Tel: + 38 (0472) 39 61 17 Working hours: 0-24 Languages: Ukrainian
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SECTION 2: HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

It is classified as a hazardous substance according to the criteria of the Regulation 1272/2008 (CLP)

Class	Category	Hazard statement
Compressed gas	Refrigerated liquefied gas	H281: Contains refrigerated gas; may cause cryogenic burns or injury.

2.2 Label elements

Labelling in accordance with Regulation 1272/2008 (CLP)

Hazard pictogram(s):



GHS04

Signal word:	Warning
Hazard statements:	H281: Contains refrigerated gas; may cause cryogenic burns or injury
Precautionary Statements (Prevention):	P282: Wear cold insulating gloves and either face shield or eye protection.
Precautionary Statements (Response):	P336 + P315: Thaw frosted parts with lukewarm water. Do not rub affected area. Get immediate medical advice/attention.
Precautionary Statements (Storage):	P403: store in a well-ventilated place.
Precautionary Statements (Disposal):	-

Supplemental information: EIGA-As: Asphyxiant in high concentrations

2.3 Other hazards:

In storage areas and workplaces, it is necessary to control the oxygen content in the air, especially in closed spaces. It is necessary to maintain the concentration of oxygen above 18% in the working premises so that there is no loss of consciousness or death of the worker.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Components	CAS No.	Concentration
Carbon dioxide	124-38-9	Not less than 99,9 %

3.2 Mixtures

Not applicable

SECTION 4: FIRST AID MEASURES

4.1 Description of first aid measures

General notes:	Rest, warmth, comfortable body position, access to clean air, facilitating the conditions for independent breathing
Following eye contact:	If there is no frostbite, immediately and thoroughly rinse the eyes with plenty of water for at least 15 minutes with the eyes wide open. If there are signs of frostbite of the eye tissues, immediately take the victim to the emergency room.
Following skin contact:	When signs of frostbite appear, carefully wash the area with warm water, preferably with soapy water or a 2% soda solution. Do not

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	attempt to heat, rub, or apply dry heat to the affected area. Carefully remove clothing; in places where the clothes have frozen, carefully cut around, leaving the hardened part in place. Apply a loose sterile bandage to the damaged area, get medical help.
Following ingestion:	Ingestion is not considered a potential route of exposure.
Following inhalation:	Rinse the nasopharynx with water. In case of dyspnoea, give hydrated oxygen or carbogen, in case of apnea, use artificial respiration, camphor, caffeine. For cough - codeine, dionine, milk with mineral water, soda, butter, honey. In case of cardiac arrest, take measures to restore cardiac activity and breathing, as well as automatic external defibrillation. Quickly get the victim to the emergency medical center.
Self-protection for the first aider:	-
4.2 Most important symptoms and effects, both acute and delayed	
Respiratory arrest. Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling.	
4.3 Indication of any immediate medical attention and special treatment needed	
<i>Hazards:</i> Respiratory arrest. Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling. <i>Treatment:</i> Thaw frosted parts with lukewarm water. Do not rub affected area. Get immediate medical advice/attention.	
SECTION 5: FIREFIGHTING MEASURES	
5.1 Extinguishing media	
Carbon dioxide does not burn and does not facilitate combustion.	
Suitable extinguishing media:	They are selected depending on the fire-explosive properties of combustible materials that are in the ignition zone together with this product.
Not suitable extinguishing media:	When using water, do not direct the jet directly at the leak or at the safety valves - icing may occur
5.2 Special hazards arising from the substance or mixture	
Under normal conditions - there are no dangerous decomposition products, but under the influence of UV radiation or electric discharge it decomposes into carbon monoxide and oxygen.	
5.3 Advice for firefighters	
Special firefighting safety measures:	Take into account the possibility of forming dangerous concentrations of carbon dioxide in the air. For solid carbon dioxide - when using water, do not direct the jet directly at the leak or safety valves - icing may occur. Cylinders with the substance must be cooled with water to a temperature below 52 °C even after extinguishing the fire
Special protective equipment for firefighters:	Use insulating breathing equipment and protective clothing made of resistant materials
SECTION 6: ACCIDENTAL RELEASE MEASURES	
6.1 Personal precautions, protective equipment and emergency procedures	
6.1.1 For non-emergency personnel	
<i>Protective equipment:</i> If necessary, use appropriate personal protective equipment. <i>Emergency procedures:</i> Evacuate area. Provide adequate ventilation. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe.	
6.1.2 For emergency responders	
If protective clothing is required for spill containment, see section 8 for suitable and unsuitable materials. See also information in the subsection "For non-emergency personnel"	

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6.2 Environmental precautions:	
Prevent further leakage or spillage if safe to do so	
6.3 Methods and material for containment and cleaning up:	
Provide adequate ventilation. Liquid spills can cause structural materials to become brittle	
6.4 Reference to other sections	
See sections 8 and 13	
SECTION 7: HANDLING AND STORAGE	
7.1 Precautions for safe handling	
It is necessary to work with the substance in premises equipped with a general exchange supply and exhaust ventilation system and emergency ventilation (during operation of ventilation systems, it is necessary to maintain the concentration of oxygen in the working areas above 18%). Equipment, communications and capacities used for storage and transportation of carbon dioxide must be airtight. Carbon dioxide in cylinders is transported by all modes of transport in accordance with the rules of cargo transportation in force on the respective modes of transport. During transportation, the cylinders must be in a horizontal position with spacers between them or in a vertical position if there are protective rings and if they are tightly loaded with protection against possible falling. Solid carbon dioxide (dry ice) is transported by rail in covered wagons	
7.2 Conditions for safe storage, including any incompatibilities	
Store liquid and gaseous carbon dioxide in metal cylinders under pressure, in well-ventilated areas, away from heat sources and direct sunlight. In areas for storing CO ₂ gas cylinders, the temperature should not exceed 52 °C or be below minus 29 °C. Blocks of solid carbon dioxide are stored in special well-ventilated storages in isothermal containers at atmospheric pressure at a distance from heat sources. It is forbidden to store solid carbon dioxide in hermetically sealed containers that do not have safety valves. In storage areas and workplaces, it is necessary to control the oxygen content in the air, especially in closed spaces. The temperature in closed storage areas should not exceed +35 °C. In the presence of moisture under the influence of CO ₂ , some metals corrode to a small extent, for example, iron-nickel alloys. Carbon dioxide does not burn and does not facilitate combustion. At a temperature >1700 °C, carbon dioxide decomposes into monoxide and oxygen.	
Incompatibility with substances:	Bases, amines, ammonia, alkali metals, acrylaldehyde, aziridine, metal acetylides, peroxides, sodium carbide, lithium aluminum hydride, some metals in powder form (Al and its alloys, Mg, Ti, Zr, Cr, Mn)
7.3 Specific end use(s):	-
SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION	
8.1 Control parameters	
8.1.1 National occupational exposure limit values: GDKrz (CO ₂) = 8000 mg/m ³ (vapour) in the air of the working area, hazard class III. Exposure limit values: IDLH (Immediately Dangerous to Life and Health) – 40000 ppm. OSHA PEL 8 hours TWA: 5000 ppm (9000 mg/m ³). STEL 30000 ppm (54000 mg/m ³). NIOSH REL 10 hours TWA: 5000 ppm (9000 mg/m ³). REL for a 15-minute short-term exposure 30000 ppm (54000 mg/m ³). TLV 10-hours TWA: 10000 ppm (18000 mg/m ³). TLV 8-hours TWA: 5000 ppm. TLV Basis – critical exposure – asphyxiation.	
Supplemental information: Atmospheric air: Regulation in this environment is not required. Water VOGPKPV: Regulation in this environment is not required.	

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<i>Water RGV:</i> Regulation in this environment is not required.	
<i>Skin:</i> Regulation in this environment is not required.	
<i>Food:</i> Regulation in this environment is not required.	
<i>Soil:</i> Regulation in this environment is not required	
8.1.2 National biological limit values: Not available	
8.1.3 PNEC (Predicted no-effect concentration): Not available	
8.1.4 DNEL: Not available	
8.1.5 Monitoring procedures:	
<i>Atmospheric air:</i> No approved measurement methods were found.	
<i>The air of the working area:</i> Gas chromatographic measurement. Gas chromatographic measurement with a thermal conductivity detector.	
<i>Water VOGPKPV:</i> No approved measurement methods were found.	
<i>Water RGV:</i> No approved measurement methods were found.	
<i>Skin:</i> No approved measurement methods were found.	
<i>Food:</i> No approved measurement methods were found.	
<i>Soil:</i> No approved measurement methods were found	
8.2 Exposure controls	
8.2.1 Appropriate engineering controls:	
It is necessary to work with the substance in areas equipped with a general supply and exhaust ventilation system and emergency ventilation (when the ventilation systems are operating, it is necessary to maintain the oxygen concentration in the working areas above 18%)	
8.2.2 Personal protection equipment:	
<i>Eye and face protection:</i>	Safety glasses/face shield
<i>Skin protection:</i> <i>Hand protection:</i> <i>Other:</i>	Protective gloves, depending on the conditions, the material of the gloves should take into account the appropriate cryoprotection Cryo-protective overalls and special footwear when working with liquefied carbon dioxide
<i>Respiratory protection:</i>	With a high concentration of CO ₂ and a normal concentration of O ₂ : insulating breathing equipment (gas mask PSh-1, PSh-2); at a low O ₂ concentration, insulating devices with oxygen supply are mandatory
<i>Thermal hazards</i>	If there is a risk of contact with liquid, all protective equipment designed for extreme low temperatures must be used
<i>Environmental exposure controls:</i>	For waste disposal see Section 13. It is also necessary to monitor emissions from ventilation or from operating equipment to ensure their compliance with environmental regulations. In some cases, it is necessary to install filters or modify work equipment to reduce emissions to an acceptable level
SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES	
9.1 Information on basic physical and chemical properties	
Appearance:	Depending on the temperature and pressure, CO ₂ can exist in different aggregate states: gaseous (under normal temperature and pressure), liquid (when refrigerated or compressed), solid state (at low temperatures)
Odour:	None
Odour threshold:	-
pH:	3,7 (saturated aqueous solution)

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Melting point/Freezing point:	- 56,6 °C (triple point)
Boiling point:	Not applicable (the substance sublimes)
Flash-point:	Not relevant
Critical temperature:	31,1 °C
Evaporation rate:	-
Flammability (solid, gas):	Non-flammable
Upper/lower flammability or explosive limits:	Not applicable
Vapour pressure:	34,4 atm at 0 °C
Critical pressure:	7383 kPa (72,9 atm.)
Vapour density (air = 1):	1,522 (21 °C)
Relative density:	1,839 g/dm ³ (gas, 20 °C and 760 mm Hg); 1,56 g/dm ³ at (-79) °C
Solubility in water:	0.335 wt.% (0 °C); 0.169 wt.% (20 °C). Solubility of ml of CO ₂ /100 ml of water at 760 mm Hg: 171 (0 °C); 88 (20 °C); 36 (60 °C)
Partition coefficient n-octanol/water:	log P _(oct) = 0,83 (experimentally)
Auto ignition temperature:	No auto-ignition
Decomposition temperature:	Not applicable
Viscosity:	-
Explosive properties:	Not applicable
Oxidizing properties:	Not applicable

9.2 Other information:

Solubility in fats: not available.

Solubility in other solvents: solubility of CO₂, ml/g at 20 °C: 8.2 in acetone; 6.3 in ethanol; 2.71 in benzene; 4.1 in methanol; 3.0 in toluene; 2.31 in xylene; 2.8 in heptane; 7.4 in methyl acetate; 6.3 in diethyl ether. Dissolves in sulfuric and acetic acids, lower alcohols, chloroform, carbon tetrachloride. Liquid carbon dioxide dissolves in ethanol and diethyl ether.

Miscibility (substance-water, 20 °C): not available. Miscible with hydrocarbons and most organic solvents.

Molecular (atomic) mass: 44.009 aom.

SECTION 10: STABILITY AND REACTIVITY

10.1 Reactivity:

There is no danger of reactivity other than the effects described in the subsection below

10.2 Chemical stability:

The product is stable under normal conditions.

Depending on the temperature and pressure, CO₂ can exist in different aggregate states: gaseous (under normal conditions of temperature and pressure), liquid (when refrigerated or compressed), solid state (at low temperatures)

10.3 Possibility of hazardous reactions: None

10.4 Conditions to avoid: None

10.5 Incompatible materials

Bases, amines, ammonia, alkali metals, acrylaldehyde, aziridine, metal acetylides, peroxides, sodium carbide, lithium aluminum hydride, some metals in powder form (Al and its alloys, Mg, Ti, Zr, Cr, Mn)

10.6 Hazardous decomposition products

Under normal conditions of storage and use, no hazardous decomposition products should be formed. Under the influence of UV radiation or an electric discharge, it decomposes into carbon monoxide and oxygen

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SECTION 11: TOXICOLOGICAL INFORMATION

11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008

11.1.1 Acute toxicity:	CL ₅₀ = 200000 ppm (mouse; 2 hours). For humans, the lethal concentration of CO ₂ when inhaled for 5 minutes is 164725 mg/m ³
11.1.2 Irritation:	<p><i>Skin:</i> Yes (human: hyperemia, paresthesias; contact with liquefied CO₂ causes frostbite; mouse; single application of solid carbon dioxide for 1 second - causes frostbite at the point of contact; repeated - skin tightening and irritation).</p> <p><i>Eyes:</i> Yes (human; burning sensation; contact with liquefied CO₂ causes frostbite, eye damage, loss of vision; direct contact of the mucous membrane of the eye with solid carbon dioxide causes irreversible eye damage or blindness).</p> <p><i>Respiratory:</i> Yes (inhalation of high concentrations of CO₂ affects vision/deterioration of night vision, increased light sensitivity, causes dizziness and asphyxiation).</p>
11.1.3 Respiratory or skin sensitisation:	Not available
11.1.4 Germ cell mutagenicity:	Not available
11.1.5 Carcinogenicity:	Human: not available. Animals: not available. MABP Assessment (IARC): MABP has not assessed the carcinogenicity of carbon dioxide. ACGIH does not consider this substance to be a carcinogen. The NTP has not included carbon dioxide in its reports on carcinogens.
11.1.6 Reproductive toxicity:	<p><i>Embryotoxic effect:</i> Observed at a concentration of 36606 mg/m³ (mouse; inhaled for 8 hours for 10 days; due to increased post-implantation death of embryos). TCL₀ = 6 ppb/24 hours (female rat; inhalation; 10 days of pregnancy, decrease in the weight of newborns, abnormalities in the development of musculoskeletal, cardiovascular, respiratory systems of the fetus). TCL₀ = 2 ppb/8 hours (female mice; inhalation; 10 days of gestation; postimplantation mortality, fetal musculoskeletal disorders).</p> <p><i>Gonadotoxic effect:</i> Observed at a concentration of 1006656 mg/m³ (mouse; inhaled for 2 hours for 3 days; violation of spermatogenesis and fertility index). TCL₀ = 55 ppb/2 hours (male rat; inhalation; 3 days before mating; effects on spermatogenesis). TCL₀ = 55 ppb/4 hours (male mice; inhalation; 6 days before mating; decreased male fertility index).</p> <p><i>Teratogenic effect:</i> It is observed at a concentration of 109817 mg/m³ (rat; inhaled for 24 hours for 10 days; due to impaired development of the skeletal-muscular, cardiovascular and respiratory systems in the fetus, a decrease in the body weight of newborns); (mouse, concentration of 36606 mg/m³ by inhalation for 8 hours for 10 days; due to impaired development of the skeletal and muscular system in the fetus); (rabbit, concentration 237937 mg/m³, inhaled for 4 hours for 9-12 days; due to impaired development of the skeletal and muscular system of the fetus). TCL₀ = 6 ppb/24 hours (female rat; inhalation; 10 days of pregnancy, decreased weight of newborns, abnormalities in the development of musculoskeletal, cardiovascular,</p>

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	respiratory systems of the fetus). $TCL_0 = 13$ ppb/4 hours (female rabbit; inhalation; 9-12 days of pregnancy; specific abnormalities in the development of the musculoskeletal system of the fetus)
11.1.7 STOT-single exposure:	-
11.1.8 STOT-repeated exposure:	-
11.1.9 Aspiration hazard	-
SECTION 12: ECOLOGICAL INFORMATION	
12.1 Toxicity	
Acute toxicity for fish:	$CL_{50} = 240$ mg/l (Rainbow Trout; 1h) $CL_{50} = 60-240$ mg/l (Rainbow Trout; 12h) $CL_{50} = 35$ mg/l (Rainbow Trout; 96h)
Acute toxicity for Daphnia magna:	Not available
Toxic effect on algae (culture):	Not available
Toxic effect on soil invertebrates:	Caenorhabditis elegans (roundworm) adults avoid CO_2 levels above 0.5%; they can respond both to the absolute concentration of CO_2 and to changes in the level of CO_2 within seconds
Identified effects on model ecosystems:	Adult insects and their larvae are quickly anesthetized with carbon dioxide. For example, under the influence of CO_2 , Drosophila larvae are quickly immobilized
Supplemental information: Carbon dioxide is part of the Earth's lithosphere, hydrosphere, and atmosphere. Carbon dioxide is the main greenhouse gas emitted by human activity.	
12.2 Persistence and degradability	
Does not decompose under normal conditions. Under the influence of UV radiation or an electric discharge, it decomposes into carbon monoxide and oxygen.	
12.3 Bioaccumulative potential	
Partition coefficient "n-octanol/water":	$\log P_{(oct)} = 0,83$ (experimentally)
This product is expected to be biodegradable and will not persist for long periods in the aquatic environment	
12.4 Mobility in soil	
Due to its high volatility, the product will not cause land or water pollution	
12.5 Results of PBT and vPvB assessment:	
Not classified	
12.6 Other adverse effects: -	
12.7 Supplemental information: An increase in the CO_2 content in the atmospheric air, mainly due to human burning of fossil fuels, causes a decrease in the pH of the ocean, which, in turn, completely shifts the carbonate balance in seawater. Seawater acidification changes the biogeochemical cycles of many elements and compounds	
SECTION 13: DISPOSAL CONSIDERATIONS	
13.1 Waste treatment methods	
13.1.1 Product/packaging disposal:	Dispersion of the evaporated product in atmospheric air. For solid carbon dioxide – return to the production cycle. Dispose of the container only through the supplier
Waste codes/waste designations according to the Register of Waste (LoW) (Commission Decision 2001/118/EC):	16 05 05: Gases pressure containers other than those mentioned 16 05 04
13.1.2 Waste treatment-relevant information:	Waste must be disposed of in accordance with state/local laws and should not be discharged into open bodies of water without first being

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	treated at a sewage treatment plant
13.1.3 Sewage disposal-relevant information:	Wastewater treatment must be carried out in accordance with state/local legislation
13.1.4 Other disposal recommendations:	See sections 8 and 13

SECTION 14: TRANSPORT INFORMATION

	ADR	RID	IMDG	IATA
14.1 UN number or ID number	UN 2187	UN 2187	UN 2187	UN 2187
14.2 UN proper shipping name	Carbon dioxide, refrigerated liquid	Carbon dioxide, refrigerated liquid	Carbon dioxide, refrigerated liquid	Carbon dioxide, refrigerated liquid
14.3 Transport hazard class(es):				
14.3.1 Class	2	2	2.2	2.2
14.3.2 Label(s):	2.2	2.2	2.2	2.2, 74C
14.3.3 Hazard ID-number:	22	-	-	-
14.3.4 Tunnels passage restriction code:	(C/E)	-	-	-
14.3.5 Emergency code:	2T	-	-	-
14.3.6 EmS number:	-	-	F-C, S-V	-
14.4 Packing group	-	-	-	-
14.5 Environmental hazards	-	-	-	-
14.6 Special precautions for user	-	-	-	-
Supplemental information	-	-	-	Passenger and cargo aircraft: allowed. Cargo aircraft only: allowed.

14.7 Maritime transport in bulk according to IMO instruments:

Not applicable

Supplemental information:

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 that they are firmly secured. Ensure that the container valve is closed and not leaking. Container valve guards or caps should be in place. Ensure adequate air ventilation.

SECTION 15: REGULATORY INFORMATION

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

EU regulations

Authorisations and/or restrictions on use:

Authorisation:

EU Regulation (EC) No. 1907/2006 (REACH)

Annex XIV - List of substances subject to authorisation

Substances of very high concern

None of the components are listed

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<i>Restrictions on use:</i> Annex XVII – Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles	Not applicable
National regulations (country):	Not available
Other EU Regulations: Annex I of Seveso II Directive 96/82/EC:	Not available
<i>15.2 Chemical safety assessment:</i>	Exempted from registration according to Annex IV of Regulation (EC) No. 1907/2006 (REACH). This product does not require a CSA

SECTION 16: OTHER INFORMATION

The information provided in this safety data sheet is correct to the best of our knowledge, information, and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal, and release and is not to be considered a warranty or quality specification. The information relates only to this specific substance and may not be valid for such substance used in combination with any other materials or in any proceed, unless specified in the text.

16.1 Indication of changes:

-

16.2 Abbreviations and acronyms:

- VOGPKPV – Water bodies for household, drinking and cultural water use.
- GDK – Maximum permissible concentration.
- RGV – Fishing ponds.
- rz – Working area.
- ACGIH – American Conference of Governmental Industrial Hygienists.
- ADR – Agreement on Dangerous Goods by Road.
- CAS – Chemical Abstracts Service.
- CLP – Classification, Labelling and Packaging of chemicals.
- CL₅₀ – average lethal concentration, this is the concentration of a substance that causes the death of 50% of test animals with a 2-4 hour inhalation effect.
- EINECS – European Inventory of Existing Chemical Substances.
- GHS – The Globally Harmonized System of Classification and Labeling of Chemicals .
- IARC – International Agency for Research of Cancer.
- IATA – International Air Transport Association.
- IBC Code – International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk.
- IDLH – Immediately Dangerous to Life and Health.
- IMDG – International Maritime Dangerous Goods.
- IUPAC – International Union of Pure and Applied Chemistry.
- LoW – List of Wastes.
- MARPOL – International Convention for the Prevention of Pollution From Ships.
- NIOSH – National Institute for Occupational Safety and Health.
- OSHA – Occupational Safety and Health Administration.
- PEL – Permissible Exposure Limit.
- REACH – Registration, Evaluation, Authorisation and Restriction of Chemicals.
- RID – International Rule for Transport of Dangerous Substances by Railway.

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- TCL₀ – Lowest Toxic Concentration.
- TLV – TWA – Threshold Limit Value – Time Weighted Average.
- UN – United Nations.

16.3 Key literature references and sources for data:

Safety Data Card of Hazardous Factor “Carbon Dioxide”.

CHEMINFO. Issue 2022.

HSDB. Issue 2019.

RTECS. Issue 2021.

Transport 49CFR. Issue 2014.

NIOSH pocket guide to chemical hazards. Issue 2012.

European Inventory of Existing Commercial Chemical Substances. IUCLID Chemical Data Sheet

16.4 Training advice:	In accordance with the state/local regulations
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16.5 Further information:	-
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16.6 Full text of classifications [CLP/GHS]:	-
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