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Safety advice.

Compressed gases

Safety Data Sheet
CARBON DIOXIDE
Issue Date: 01-Mar-2014
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Version: 01

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name	CARBON DIOXIDE, GAS
UN-Number	UN1013
Recommended Use	Compressed gas, Liquefied gas - Stored under pressure [NOT TO BE USED AS MEDICINAL GAS]
Synonyms	Carbonic Anhydride, Carbonic Acid Gas
Manufacturer's Registered Office	Oxygen House, P-43 Taratala Road, Kolkata - 700 088, India www.linde.in
Telephone Number	(+91 33) 66021600
24 Hour Emergency Contact Number:	(+91) 9831851034

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2. HAZARDS IDENTIFICATION

WARNING! EMERGENCY OVERVIEW

Simple asphyxiant - this product does not contain oxygen and may cause suffocation if released in a confined area. Maintain oxygen levels above 19.5%.

Carbon dioxide acts as a weak narcotic at high concentrations (30,000 ppm).
Inhalation of a high concentration of carbon dioxide can cause reduced hearing acuity, changes in respiration, and increased blood pressure and pulse
Keep at temperatures below 520C / 1250F

Appearance Colorless **Physical State** Compressed gas **Odor** Odorless

OSHA Regulatory Status	This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
Potential Health Effects	
Principle Routes of Exposure	Inhalation.
Acute Toxicity	
Inhalation	Simple asphyxiant. May cause suffocation by displacing the oxygen in the air. Exposure to an oxygen-deficient atmosphere (<19.5%) may cause dizziness, drowsiness, nausea, vomiting, excess salivation, diminished mental alertness, loss of consciousness, and death. Exposure to atmospheres containing 8-10% or less oxygen will bring about unconsciousness without warning and so quickly that the individuals cannot help or protect themselves. Lack of sufficient oxygen may cause serious injury or death. Depending on concentration and duration of exposure to carbon dioxide may cause increased respiration, headache, mild narcotic effects, increased blood pressure and pulse, and asphyxiation. Symptoms of overexposure become more apparent when atmospheric oxygen is decreased to 15-17%.
Eyes	None known. Contact with rapidly expanding gas near the point of release may cause severe harm.
Skin	None known
Skin Absorption Hazard	No known hazard in contact with skin
Ingestion	None known
Chronic Effects	Chronic harmful effects are not known from repeated inhalation of concentrations below PEL/TLV
Aggravated Medical Conditions	Respiratory disorders
Environmental Hazard	See Section 12 for additional Ecological Information

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS-No	Volume %	Chemical Formula
Carbon dioxide	124-38-9	>99	CO_2

4. FIRST AID MEASURES

Eye Contact	None under normal use. Get medical attention if symptoms occur.
Skin Contact	None under normal use. Get medical attention if symptoms occur.
Inhalation	PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF INHALATION OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS (SCBA). Conscious inhalation victims should be assisted to an uncontaminated area and inhale fresh air. If breathing is difficult, Administer oxygen under medical supervision / trained personnel supervision. Unconscious persons should be moved to an uncontaminated area and as necessary, given artificial resuscitation and supplemental oxygen. Treatment should be symptomatic and supportive.

Ingestion	None under normal use. Get medical attention if symptoms occur.
Notes to Physician	Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Flammable Properties	Not flammable. Does not support combustion.
Suitable Extinguishing Media	Use extinguishing measures appropriate to local circumstances and the surrounding environment.

Explosion Data

Sensitivity to Mechanical Impact	None
Sensitivity to Static Discharge	None
Specific Hazards Arising from the Chemical	Cylinders may rupture under extreme heat. Continue to cool fire-exposed cylinders until flames are extinguished. Damaged cylinders should be handled only by specialists.
Protective Equipment and Precautions for Firefighters	As in any fire, wear self-contained breathing apparatus pressure-demand, NIOSH (approved or equivalent), and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions	Ensure adequate ventilation. Evacuate personnel to safe areas. Use personal protective equipment. Monitor oxygen level.
Environmental Precautions	Prevent the spreading of vapors through sewers, ventilation systems, and confined areas.
Methods for Containment	Stop the flow of gas or remove the cylinder to an outdoor location if this can be done without risk. If a leak is in the container or container valve, contact the appropriate emergency telephone number in Section 1 or callyour closest Linde location.
Methods for Cleaning Up	Return cylinder to Linde India Ltd.

7. HANDLING AND STORAGE

Handling

Use only in ventilated areas. Never attempt to lift a cylinder by its valve protection cap.

Protect cylinders from physical damage; do not drag, roll, slide or drop. When moving cylinders, even for a short distance, use a cart designed to transport cylinders. Use equipment rated for cylinder pressure. Use a backflow preventive device in the piping. Never insert an object (e.g., wrench, screwdriver, pry bar, etc.) into valve cap openings. Doing so may damage the valve, causing a leak to occur.

Close valve after each use and when empty. If a user experiences any difficulty operating the cylinder valve discontinue use and contact the supplier.

Never put cylinders into trunks of cars or unventilated areas of passenger vehicles. Never attempt to re-fill a compressed gas cylinder without the owner's written consent. Never strike an arc on a compressed gas cylinder or make a cylinder a part of an electrical circuit. For applications with moist Carbon Dioxide, 316, 309, and 310 stainless steel may be used as well as Hastelloy ®A, B, & C and Monel®. Ferrous nickel alloys are slightly susceptible to corrosion. At normal temperatures, carbon dioxide is compatible with most plastics and elastomers.

For additional storage recommendations, consult rule no 20 of the Gas Cylinders, Rules,2016.

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Storage

Protect from physical damage. Cylinders should be stored upright with valve protection cap in place and firmly secured to prevent falling. Store in cool, dry, well-ventilated area of non-combustible construction away from high traffic areas and emergency exits. Keep at temperatures below 52°C / 125°F.
Full and empty cylinders should be segregated. Use a "First-In-First-Out" (FIFO) inventory system to prevent full cylinders from being stored for excessive periods of time. Always store and handle compressed gas cylinders in accordance with rule no 21 of the Gas Cylinders, Rules,2016.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Carbon dioxide 124-38-9	STEL = 30000 ppm TWA: 5000 ppm	TWA: 5000 ppm TWA: 9000 mg/m3 (vacated) TWA: 10000 ppm (vacated) TWA: 18000 mg/m3 (vacated) STEL: 30000 ppm (vacated) STEL: 54000 mg/m3	IDLH: 40000 ppm TWA: 5000 ppm TWA: 9000 mg/m3 STEL: 30000 ppm STEL: 54000 mg/m3

Immediately Dangerous to Life or Health.

Engineering Measures

Local exhaust ventilation to prevent accumulation of high concentrations and maintain air-oxygen levels at or above 19.5%.

Ventilation

Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/Face Protection

Wear protective eyewear (safety glasses).

Skin and Body Protection

Work gloves and safety shoes are recommended when handling cylinders.

Respiratory Protection

General Use

No special protective equipment required.

Emergency Use

Use positive pressure airline respirator with escape cylinder or self-contained breathing apparatus for oxygen-deficient atmospheres (<19.5%).

Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Colorless.	**Odor**	Odorless.
Odor Threshold	No information available.	**Physical State**	Compressed gas
Flash Point	Not flammable	**Autoignition Temperature**	No information available
Decomposition Temperature	No information available.	**Boiling Point/Boiling Range**	(Sublimes) -78.5 °C / -109.3 °F
Freezing Point	-56.6°C / -69.8 °F	**Molecular Weight**	44.01
Water Solubility	0.145 g/ml @25°C	**Evaporation Rate**	No information available
Vapor Pressure	856 PSIA @ 70°F	**Vapor Density**	1.53 at 70°F (air = 1)
VOC Content (%)	Not applicable.	**Flammability Limits in Air**	
		Upper	Not applicable
		Lower	Not applicable

10 STABILITY AND REACTIVITY

Stability

Stable.

Incompatible Products

Certain reactive metals, hydrides, moist cesium monoxide, or lithium acetylene carbide di ammino may

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ignite. Passing carbon dioxide over a mixture of sodium peroxide and aluminum or magnesium may explode.

Conditions to Avoid	Due to the presence of Carbon dioxide, Carbonic acid is formed in the presence of moisture.
Hazardous Decomposition Products	Carbon monoxide (CO). Oxygen.
Hazardous Polymerization	Hazardous polymerization does not occur.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity

LD50 Oral:	No information available.
LD50 Dermal:	No information available.
LC50 Inhalation:	No information available.
Inhalation	Acidosis, adrenal cortical exhaustion, and other metabolic stresses have resulted from prolonged continuous exposure to 1-2% carbon dioxide (10,000 ppm-20,000 ppm). The ACGIH TLV of 5,000 ppm is expected to provide a good margin of safety from asphyxiation and undue metabolic stress provided sufficient oxygen levels are maintained in the air. Increased physical activity, duration of exposure, and decreased oxygen content can affect systemic and respiratory effects resulting from exposure to carbon dioxide.
Repeated Dose Toxicity	Chronic, harmful effects are not known from repeated inhalation of low (3-5 molar%) concentrations.

Toxicity

Chronic Toxicity	Chronic harmful effects are not known from repeated inhalation of concentrations below PEL/TLV.
Carcinogenicity	Contains no ingredient listed as a carcinogen.
Irritation	No information available.
Sensitization	No information available.
Reproductive Toxicity	No information available.
Developmental Toxicity	Oxygen deficiency during pregnancy has produced developmental abnormalities in humans and experimental animals.
Synergistic Materials	None known.
Target Organ Effects	Central vascular system (CVS). Respiratory system.

12. ECOLOGICAL INFORMATION

Ecotoxicity

The environmental impact of this product has not been fully investigated.

Ozone depletion potential; ODP; (R-11 = 1): Does not contain ozone depleting chemical (40 CFR Part 82).

13. DISPOSAL CONSIDERATIONS

Waste Disposal Methods Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to Linde for proper disposal.

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14. TRANSPORT INFORMATION

DOT

Proper shipping name	Carbon dioxide
Hazard Class	2.2
UN-Number	UN1013
Description	UN1013, Carbon dioxide, 2.2

ADR

Proper Shipping Name	Carbon dioxide
Hazard Class	2.2
UN-Number	UN1013
Classification Code	2A
Description	UN1013, Carbon dioxide, 2.2

15. REGULATORY INFORMATION

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	No
Fire Hazard	No
Sudden Release of Pressure Hazard	Yes
Reactive Hazard	No

16. OTHER INFORMATION

General:	Ensure all national/ local regulations are observed. The hazard of asphyxiation is often overlooked and must be stressed during operator training.
Document Information:	In preparing this document help has been taken from MSDS for Linde (US)

End of Safety Data Sheet

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