SAFETY DATA SHEET

Carbon Dioxide, Solid (Dry Ice)

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

1.1 Product Details

Product Name	:	Carbon Dioxide, solid; Dry Ice
Recommended use	:	Industrial and professional. Perform risk assessment prior to use. Blast cleaning. Cooling applications. Food freezing. Freezing, Cooling and heat transfer. Laboratory use. Special effects (entertainment). Consumer use.
Uses advised against	:	Industrial or technical grade unsuitable for medical and/or food applications or inhalation.

1.2 Company Identification

Company's Name	:	Leeden Gases Sdn. Bhd.
Company's Address	:	Lot PT 5074 &5075, Jalan Jangur 28/43, Seksyen 28, 40400 Shah Alam, Selangor.
Emergency telephone Number	:	03-55228222 (Hunting Line) / 03-55228288 (Hotline)

SECTION 2: HAZARD IDENTIFICATION

Classification according to Regulation (EC) No 1272/2008 as amended:
Not classified.

Label Elements	:	Not applicable
Other hazards	:	Refrigerated solidified gas, exists at -78,5 °C. Contact with product may cause severe cold burns or frostbite. Asphyxiant in high concentrations.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Chemical name	:	Carbon Dioxide
CAS number	:	124-38-9
Proportion (%)	:	100%. The purity of the substance in this section is used for classification only, and does not represent the actual purity of the substance as supplied, for which other documentation should be consulted.

SECTION 4: FIRST AID MEASURES

4.1 Description of necessary first aid measures

Eye contact : Rinse the eye with water immediately. Remove contact lenses, if present and easy to do. Continue rinsing. Flush thoroughly with water for at least 15 minutes. Get immediate medical assistance. If medical assistance is not immediately available, flush an additional 15 minutes.

Inhalation : In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/ consciousness. Victim may not be aware of asphyxiation. Remove victim to uncontaminated area wearing self-contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped. Low concentrations of CO_2 cause increased respiration and headache.

Skin contact : Contact with solid (dry ice) may cause frostbite or freezing of skin. If clothing is saturated with the liquid and adhering to the skin then the area should be thawed with lukewarm water prior to removing the clothing.

Ingestion : Swallowing must be absolutely avoided, since coldness and developing pressure could be dangerous. Obtain medical attention and take along these instructions

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

Respiratory arrest. Contact with solid (dry ice) can cause damage (frostbite) due to rapid evaporative cooling.

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

Hazards : Respiratory arrest. Contact with solid (dry ice) can cause damage (frostbite) due to rapid evaporative cooling.

Treatment : Thaw frosted parts with lukewarm water. Do not rub affected area. Get immediate medical advice/ attention.

SECTION 5: FIRE FIGHTING MEASURES

Extinguishing Media : Material will not burn. In case of fire in the surroundings: use appropriate extinguishing agent.

Special fire-fighting procedures : In case of fire: Stop leak if safe to do so. Continue water spray from protected position until container stays cool. Use extinguishants to contain the fire. Isolate the source of the fire or let it burn out.

Special protective equipment for fire-fighters : Fire-fighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.

SECTION 6: ACCIDENTAL RELEASE MEASURE

Personal precautions, protective equipment and emergency procedures	:	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.
Environmental Precautions	:	Prevent further leakage or spillage if safe to do so.
Methods and material for containment and cleaning up	:	Provide adequate ventilation.

SECTION 7: HANDLING AND STORAGE

Handling	:	Do not use in confined spaces without adequate ventilation and/or respirator. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Refer to supplier's handling instructions. The substance must be handled in accordance with good industrial hygiene and safety procedures. Protect containers from physical damage; do not drag, roll, slide or drop. Do not remove or deface labels provided by the supplier for the identification of the container contents. When moving containers, even for short distances, use appropriate equipment eg. trolley, hand truck, fork truck etc. Provide adequate ventilation. When using do not eat, drink or smoke.
Storage	:	Keep container below 50°C in a well-ventilated place. Observe all regulations and local requirements regarding storage of containers

SECTION 8: EXPOSURE CONTROL AND PERSONAL PREOTECTION

8.1 Control Parameters

Occupational Exposure Limits

Chemical name	Type	Exposure Limit Values	Source
Carbon dioxide	TWA	5.000 ppm 9.000 mg/m^3	EU. Indicative Exposure Limit Values in Directives 91/322/EEC, 2000/39/EC, 2006/15/EC, 2009/161/EU (12 2009)

8.2 Exposure controls

Appropriate engineering controls	:	Consider a work permit system e.g. for maintenance activities. Ensure adequate air ventilation. Oxygen detectors should be used when asphyxiating gases may be released. Provide adequate ventilation, including appropriate local extraction, to ensure that the defined

occupational exposure limit is not exceeded. Do not eat, drink or smoke when using the product.

Individual protection measures, such as personal protective equipment:

Eye/face protection	:	Safety eyewear, goggles or face-shield to EN166 should be used to avoid exposure to liquid splashes. Wear eye protection to EN 166 when using gases.
Hand Protection	:	Wear cold insulating gloves.
Body protection	:	Wear apron or protective clothing in case of contact.
Other	:	Wear safety shoes while handling containers
Thermal hazards	:	If there is a risk of direct contact with the solid, all protective equipment should be suitable for extremely low temperatures.
Hygiene measures	:	Specific risk management measures are not required beyond good industrial hygiene and safety procedures. Do not eat, drink or smoke when using the product.

SECTION 9: STABILITY AND REACTIVITY

Physical state	:	Solid
Form	:	Solid
Colour	:	Colourless.
Odour	:	Odourless
Odour threshold	:	Odour threshold is subjective and is inadequate to warn of over exposure.
pH	:	3,2 - 3,7 The pH of saturated CO_2 solutions varies from 3.7 at 101 kPa (1 atm) to 3.2 at 2370 kPa (23.4 atm)
Melting/freezing point	:	-56.6°C
Boiling point	:	-78.5°C
Sublimation point	:	-78.5°C
Critical temperature	:	31.0°C
Flammability (solid, gas)	:	Non-flammable solid
Vapour pressure	:	45.1 bar (10°C)
Vapour density	:	1.512 (-56.6°C)
Solubility in Water	:	2900 mg/l (25 °C)
Partition coefficient N-octanol/ water	:	0.83
Dynamic viscosity	:	0,07 mPa.s (20 °C) 0,02 mPa.s (20 °C)
Molecular weight	:	44.01 g/mole

SECTION 10: STABILITY AND REACTIVITY

Reactivity	:	No reactivity hazard other than the effects described in sub-section below.

Chemical stability	:	Stable under normal conditions.
Incompatible Materials	:	Cryogenic temperature can cause embrittlement of some metals and alter the physical properties of other materials. No reaction with any common materials in dry or wet conditions.
Hazardous Decomposition Products	:	Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11: TOXICOLOGICAL INFORMATION

No known toxicological effects from this product.

SECTION 12: ECOLOGICAL INFORMATION

No known toxicological effects from this product.

SECTION 13: DISPOSAL INFORMATION

Disposal method	:	Do not discharge into any place where its accumulation could be dangerous. Vent to atmosphere in a well-ventilated place.

SECTION 14: TRANSPORT INFORMATION

UN Number	:	UN 1845
UN proper shipping name	:	CARBON DIOXIDE, SOLID
Hazard class / Division	:	9

Additional identification	:	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

National Regulations : Occupational Safety and Health Act 1994 and relevant regulations:

- Occupational Safety and Health (Classification, Labeling and Safety Data Sheet of Hazardous Chemicals) Regulations 2013.
- Occupational Safety and Health (Use And Standards of Exposure of Chemicals Hazardous to Health) Regulations 2000

Environmental Quality Act 1974 & regulations:

- Environmental Quality (Clean Air) Regulations 2014
- Environmental Quality (Scheduled Wastes) Regulations 2005

SECTION 16: OTHER INFORMATION

Training information : Users of breathing apparatus must be trained. The hazard of asphyxiation is often overlooked and must be stressed during operator training. Ensure operators understand the hazards.

Other information : Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out. Ensure adequate air ventilation. Ensure all national/local regulations are observed. Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted.