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

Product Indentifier:	Carbon Dioxide
Chemical formula:	CO_2
Synonyms:	Carbon Dioxide, Carbonic Anhydride, Carbonic Acid Gas, Carbon Anhydride

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

Use of the Substance/Mixture:	General Industrial
Restrictions on Use:	No data available
Details of the supplier of the safety data sheet:	CryoService Ltd Warndon Business Park Worcester
Email Address – Technical:	info@cryoservice.co.uk
Telephone:	+44(0)1905 758300
Emergency telephone number:	(24h): +44(0)1905 758300

2. HAZARDS IDENTIFICATION

Classification according to Regulation 1272/2008 (CLP)

Gases under pressure - Liquefied gas. H280: Contains gas under pressure; may explode if heated.

Label Elements according to Regulation 1272/2008 (CLP)

Hazard pictograms/symbols.

Signal Word:	Warning
Hazard Statements:	H280: Contains gas under pressure; may explode if heated.
Precautionary Statements:	
Storage:	P403: Store in a well-ventilated place

Classification (Directive)

Not a hazardous substance or preparation according to EC-directives.
67/548/EEC or 1999/45/EC.
No EC labelling required.

Other hazards

Can cause rapid suffocation.
Compressed liquefied gas.
Avoid breathing gas.
Direct contact with liquid can cause frostbite.
Self contained breathing apparatus (SCBA may be required.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance/Mixture: Substance

Components	EINECS / ELINCS Number	CAS Number	Concentration (volume)
Carbon Dioxide	204-696-9	124-38-9	100 %

Components	Classification (Directive)	Classification (CLP)	REACH Reg. #
Carbon Dioxide		Press. Gas	

If REACH registration numbers do not appear the substance is either exempt from registration, does not meet the minimum volume threshold for registration, or the registration date has not yet come due.
Concentration is nominal. For the exact product composition, please refer to CryoService Limited technical specifications.

4. FIRST AID MEASURES

Description of first aid measures

General advice: Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

Eye contact: Not applicable.

Skin contact: Not applicable.

Ingestion: Ingestion is not considered a potential route of exposure.

Inhalation: Move to fresh air. If breathing has stopped or is labored, give assisted respirations. Supplemental oxygen may be indicated. If the heart has stopped, trained personnel should begin cardiopulmonary resuscitation immediately. In case of shortness of breath, give oxygen.

Most important symptoms and effects, both acute and delayed

Symptoms: Shivering fit. Sweating. Blurred vision. Headache. Increased pulse rate. Shortness of breath. Rapid respiration. Exposure to oxygen deficient atmosphere may cause the following symptoms: Dizziness, salivation, nausea, vomiting, loss of mobility/consciousness.

Indication of any immediate medical attention and special treatment needed

No data available

5. FIRE-FIGHTING MEASURES

Extinguishing media

Suitable extinguishing media: All known extinguishing media can be used.

Extinguishing media which must not be used for safety reasons: No data available.

Special hazards arising from the substance or mixture: Upon exposure to intense heat or flame, cylinder will vent rapidly and or rupture violently. Product is non-flammable and does not support combustion. Move away from container and cool with water from a protected position. Keep containers and surroundings cool with water spray.

Advice for fire-fighters: Wear self contained breathing apparatus for fire fighting if necessary.

Further information: No data available

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures:	Monitor carbon dioxide level. Evacuate personnel to safe areas. Ventilate the area. Monitor oxygen level. Wear self-contained breathing apparatus when entering the area unless atmosphere is proved to be safe.
Environmental precautions:	Should not be released into the environment. Do not discharge into any place where its accumulation could be dangerous. Prevent further leakage or spillage. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.
Methods and material for containment and cleaning up:	Ventilate the area.
Additional advice:	If possible, stop flow of product. Increase ventilation to the release area and monitor oxygen level If leak is from cylinder or cylinder valve, call the CryoService emergency telephone number. If the leak is in the user's system, close the cylinder valve and safely vent the pressure before attempting repairs.

7. HANDLING AND STORAGE

Precautions for safe handling

Protect cylinders from physical damage; do not drag, roll, slide or drop. Do not allow storage area temperature to exceed 50°C (122°F). Only experienced and properly instructed persons should handle compressed gases / cryogenic liquids. Before using the product, determine its identity by reading the label. Know and understand the properties and hazards of the product before use. When doubt exists as to the correct handling procedure for a particular gas, contact the supplier. Do not remove or deface labels provided by the supplier for the identification of the cylinder contents. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Leave valve protection guards in place. Before connecting the container, check the complete gas system for suitability, particularly for pressure rating and materials. Before connecting the container for use, ensure that back feed from the system into the container is prevented. Ensure the complete gas system is compatible for pressure rating and materials of construction. Ensure the complete gas system has been checked for leaks before use. Employ suitable pressure regulating devices on all containers when the gas is being emitted to systems with lower pressure rating than that of the container. Never insert an object (e.g. wrench, screwdriver, pry bar, etc.) into valve cap openings. Doing so may damage valve, causing a leak to occur. Open valve slowly. If user experiences any difficulty operating cylinder valve discontinue use and contact supplier. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to repair or modify container valves or safety relief devices. Damaged valves should be reported immediately to the supplier. Replace outlet caps or plugs and container caps as soon as container is disconnected from equipment. Do not subject containers to abnormal mechanical shocks which may cause damage to their valve or safety devices. Never attempt to lift large cylinders by the valve guard. Do not use containers as rollers or supports or for any other purpose than to contain the gas as supplied. Never strike an arc on a compressed gas cylinder or make a cylinder a part of an electrical circuit. Do not smoke while handling product or cylinders. Never re-compress a gas or a gas mixture without first consulting the supplier. Never attempt to transfer gases from one cylinder/container to another. Always use backflow protective device in piping. When returning cylinder install valve outlet cap or plug leak tight. Never use direct flame or electrical heating devices to raise the pressure of a container. Containers should not be subjected to temperatures above 50°C (122°F). Prolonged periods of cold temperature below -30°C (-20°F) should be avoided.

Conditions for safe storage, including any imcompatibilities

Full containers should be stored so that oldest stock is used first. Containers should be stored in a well ventilated area, preferably in the open air. Stored containers should be periodically checked for general condition and leakage. Observe all regulations and local requirements regarding storage of containers. Protect containers stored in the open against rusting and extremes of weather. Containers should not be stored in conditions likely to encourage corrosion. Containers should be stored in the vertical position and properly secured to prevent toppling. The container valves should be tightly closed and where appropriate valve outlets should be capped or plugged. Container valve guards or caps should be in place. Keep containers tightly closed in a cool, well-ventilated place. Store containers in location free from fire risk and away from sources of heat and ignition. Full and empty cylinders should be segregated. Do not allow storage temperature to exceed 50°C (122°F). Return empty containers in a timely manner.

Technical measures/Precautions

Containers should be segregated in the storage area according to the various categories (e.g. flammable, toxic, etc.) and in accordance with local regulations. Keep away from combustible material.

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Specific end use(s)

Refer to section 1 or the extended SDS if applicable.

For further information on storage, handling, and use, consult CryoService Limited.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

Exposure limit(s)

Carbon dioxide	Time Weighted Averager (TWA): EH40 WEL	5,000 ppm	9,150 mg/m3
Carbon dioxide	Short Term Exposure Limit (STEL): EH40 WEL	15,000 ppm	27,400 mg/m3
Carbon dioxide	Time Weighted Averager (TWA): EU ELV	5,000 ppm	9,000 mg/m3

If applicable, refer to the extended section of the SDS for further information on CSA.

Exposure controls

Engineering measures

Provide natural or mechanical ventilation to prevent accumulation above exposure limits.
Provide natural or mechanical ventilation to prevent oxygen deficient atmospheres below 19.5% oxygen.

Personal protective equipment

Respiratory protection:	Not required, provided use is in well ventilated area and/or protected by monitoring equipment.
Hand protection:	Sturdy work gloves are recommended for handling cylinders. The breakthrough time of the selected glove(s) must be greater than the intended use period.
Eye protection:	Safety glasses recommended when handling cylinders.
Skin and body protection:	Safety shoes are recommended when handling cylinders.
Special instructions for protection and hygiene:	Ensure adequate ventilation, especially in confined areas.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance:	Liquefied gas. Colourless gas.
Odor:	No odor warning properties.
Odor threshold:	No data available.
pH:	Not applicable.
Melting point/range:	-56.6 °C (-70 °F)
Boiling point/range:	-88.1 °C (-127 °F)
Flash point:	Not applicable.
Evaporation rate:	Not applicable.
Flammability (solid, gas):	No data available.
Upper/lower explosion/flammability limit:	No data available.
Vapour pressure:	831.04 psia (57.30 bar) at 20 °C (68 °F)
Water solubility:	2.000 g/l
Relative vapor density:	1.519 (air = 1)
Relative density:	0.82 (water = 1)
Partition coefficient (n-octanol/water):	Not applicable.
Autoignition temperature:	No data available.
Decomposition temperature:	No data available.
Viscosity:	Not applicable.
Explosive properties:	No data available.
Oxidising properties:	No data available.
Molecular Weight:	44.01 g/mol
Density:	0.0018 g/cm3 (0.112 lb/ft3) at 21 °C (70 °F) Note:(as vapour)
Specific Volume:	0.5456 m/kg3 (8.74 ft3/lb) at 21 °C (70 °F)

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10. STABILITY AND REACTIVITY

Reactivity:	Refer to possibility of hazardous reactions and/or incompatible materials sections.
Chemical stability:	Stable under normal conditions.
Possibility of hazardous reactions:	No data available.
Conditions to avoid:	No data available.
Incompatible materials:	No data available.
Hazardous decomposition Products:	No data available.

11. TOXICOLOGICAL INFORMATION

Information on toxicological effects

Likely routes of exposure

Effects on eye:	Contact with liquid may cause cold burns/frostbite.
Effects on skin:	Contact with liquid may cause cold burns/frostbite.
Inhalation effects:	Concentrations of 10% CO2 or more can produce unconsciousness or death. Unlike simple asphyxiants, carbon dioxide has the ability to cause death even when normal oxygen levels (20-21%) are maintained. Carbon Dioxide is physiologically active, affecting circulation and breathing. At concentrations between 2 and 10%, carbon dioxide can cause nausea, dizziness, headache, mental confusion, increased blood preasure and respiratory rate. In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. Asphyxiation may bring about unconsciousness without warning and so rapidly that victim may be unable to protect themselves.
Ingestion effects:	Ingestion is not considered a potential route of exposure.
Symptoms:	Exposure to oxygen deficient atmosphere may cause the following symptoms: Dizziness, salivation, nausea, vomiting, loss of mobility/consciousness. Shivering fit. Sweating. Blurred vision. Headache. Increased pulse rate. Shortness of breath. Rapid respiration.

Acute Toxicity

Acute Oral Toxicity:	No data is available on the product itself.
Inhalation:	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 (CO2, NO2). CO2 has been shown to enhance the production of carboxy or met-hemoglobin by these gases possibly due to carbon dioxide's stumulatory effects on the respiratory and circulatory systems.
Acute Dermal Toxicity:	No data is available on the product itself.
Skin corrosion/irritation:	No data available.
Serious eye damage/ eye irritation:	No data available.
Sensitisation:	No data available.

Chronic toxicity or effects from long term exposures

Carcinogenicity:	No data available.
Reproductive toxicity:	No data available on the product itself.
Germ cell mutagenicity:	No data available on the product itself.
Specific target organ systemic toxicity (single exposure):	No data available.
Specific target organ systemic toxicity (repeated exposure):	No data available.
Aspiration hazard:	No data available.

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12. ECOLOGICAL INFORMATION

Toxicity

Aquatic toxicity:	No data is available on the product itself.	
Toxicity to fish - Components		
Carbon Dioxide	LC50 (1 h) : 240 mg/l	Species: Rainbow trout (Oncorhynchus mykiss).
Carbon Dioxide	LC50 (96 h) : 35 mg/l	Species: Rainbow trout (Oncorhynchus mykiss).
Toxicity to other organisms:	No data is available on the product itself.	

Persistence and degradability
No data available.

Bioaccumulative potential
No data is available on the product itself.

Mobility in soil
No data available.

Reults of PBT and vPvB assessment
If applicable, refer to the extended section of the SDS for further information on CSA.

Other adverse effects
When discharged in large quantities may contribute to the greenhouse effect.

13. DISPOSAL CONSIDERATIONS

Waste treatment methods:	Return unused product in orginal container to supplier. Contact supplier if guidance is required.
Contaminated packaging:	Return container to supplier.

14. TRANSPORT INFORMATION

ADR

UN/ID No:	UN1013
Proper shipping name:	CARBON DIOXIDE
Class or Division:	2
Tunnel Code:	(C/E)
Label(s):	2.2
ADR/RID Hazard ID No:	20

IATA

UN/ID No:	UN1013
Proper shipping name:	CARBON DIOXIDE
Class or Division:	2.2
Label(s):	2.2

IMDG

UN/ID No:	UN1013
Proper shipping name:	CARBON DIOXIDE
Class or Division:	2.2
Label(s):	2.2

RID

UN/ID No:	UN1013
Proper shipping name:	CARBON DIOXIDE
Class or Division:	2
Label(s):	2.2

Further Information
Avoid transport on vehicles where the load space is not separated from the driver's compartment by a gas tight bulk head. 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. The transportation information is not intended to convey all specific regulatory data relating to this material. For complete transportation information, contact CryoService.

15. REGULATORY INFORMATION

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

Country	Regulatory List	Notification
USA	TSCA	Included on Inventory
EU	EINECS	Included on Inventory
Canada	DSL	Included on Inventory
Australia	AICS	Included on Inventory
South Korea	ECL	Included on Inventory
China	SEPA	Included on Inventory
Philippines	PICCS	Included on Inventory
Japan	ENCS	Included on Inventory

WGK Identification Number: Not water endangering.

Chemical Safety Assessment

Refer to extended SDS for CSA information.
This product is either exempt from REACH, does not meet the minimum volume threshold for a CSA, or the CSA has not yet been completed.

16. OTHER INFORMATION

Ensure all national/local regulations are observed.

Hazard Statements:
H280 Contains gas under pressure; may explode if heated.

Prepared by: CryoService Limited Safety Department

For additional information, please visit our web site at
http://www.cryoservice.co.uk

This Safety Data Sheet has been established in accordance with the applicable European Directives and applies to all countries that have translated the Directives in their national laws. Regulation (EC) No1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directive 91/155/EEC, 93/67/EEC and 2000/21/EC.

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