## 1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

| | |
|---|---|
| **Product Name** | Carbon Dioxide |
| **GHS Product Identifier** | Carbon Dioxide |
| **Chemical Name** | Carbon Dioxide ≥ 99.5 % |
| **Synonyms** | $CO_2$, Compressed carbon dioxide, Beverage $CO_2$, Food grade $CO_2$, Welding $CO_2$ |
| **Recommended Use** | MIG/MAG welding shielding (pure or as component of a mix); beverage carbonation; food-grade applications; horticultural / greenhouse enrichment; fire suppression (specialised systems). |
| **Uses Advised Against** | Any use inconsistent with this SDS or supplier instruction. |

### Details of the supplier

| | |
|---|---|
| **Supplier Name** | Puregas Aust Pty Ltd |
| **Address** | 15-17 Distribution Drive, Mickleham VIC 3064, Australia |
| **Telephone** | 1300 733 097 |
| **Email / Web** | sales@puregas.com.au |

### Emergency telephone number(s)

| | |
|---|---|
| **24 hr Emergency** | 1300 733 097 (24 hours) |
| **Fire / Ambulance / Police** | 000 (within Australia) |
| **Poisons Information Centre** | 13 11 26 (Australia) |

## 2. HAZARDS IDENTIFICATION

**CLASSIFIED AS HAZARDOUS ACCORDING TO SAFE WORK AUSTRALIA CRITERIA.**

**CLASSIFIED AS DANGEROUS GOODS BY THE CRITERIA OF THE ADG CODE.**

| | |
|---|---|
| **Physical Hazards** | Gases Under Pressure: Liquefied Gas |
| **Health Hazards** | Asphyxiant. Effects on respiration at concentrations well below those required for simple asphyxiation (narcotic at elevated levels). |
| **Environmental Hazards** | Not classified as an Environmental Hazard. Greenhouse gas if released to atmosphere. |
| **Signal Word** | WARNING |

**Pictogram:** GHS04 — Gas Cylinder (gas under pressure)

### Hazard statements

| | |
|---|---|
| **H280** | Contains gas under pressure; may explode if heated. |

### Precautionary statements

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|---|---|
| **Prevention** | Avoid breathing gas. Use only in well-ventilated areas. |
| **Response** | IF inhaled in high concentrations: remove to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTRE / doctor if you feel unwell. |
| **Storage — P410+P403** | Protect from sunlight. Store in a well-ventilated place. |
| **Disposal** | Return cylinders to supplier — see Section 13. |

### Other hazards

$CO_2$ is significantly heavier than air and will pool in pits, basements and confined spaces. Increased breathing rate, headache, drowsiness and unconsciousness can occur well before simple-asphyxiant levels — workplace $CO_2$ must be kept below 5 000 ppm (TWA). Liquid $CO_2$ or escaping high-pressure gas can cause cold burns / frostbite. Discharge of large volumes can also generate solid "dry ice" snow at very low temperatures.

## 3. COMPOSITION / INFORMATION ON INGREDIENTS

| Ingredient | CAS Number | EC Number | Content |
|---|---|---|---|
| Carbon Dioxide | 124-38-9 | 204-696-9 | ≥ 99.5 % |

*No additional ingredients are present which, within current supplier knowledge and at the concentrations applicable, are classified as hazardous to health or the environment.*

## 4. FIRST AID MEASURES

| | |
|---|---|
| **Eye contact** | Not normally required. Flush with copious water if contamination is suspected. |
| **Inhalation** | Remove casualty to fresh air, avoiding becoming a casualty yourself. If breathing is difficult or has stopped, apply artificial respiration — preferably with an automated oxygen resuscitator. Rescue from a confined space requires SCBA or air-line respirator — never enter without monitoring atmosphere first. |
| **Skin contact** | Not normally required. |
| **Ingestion** | Not a relevant route of exposure (gas). |
| **First aid facilities** | No specific facilities required beyond normal workplace first aid. |
| **Most important symptoms** | In high concentrations: headache, dizziness, drowsiness, breathing difficulty and loss of consciousness. Victim may not be aware of asphyxiation. |
| **Medical attention** | Treat symptomatically. No specific antidote. |

## 5. FIRE FIGHTING MEASURES

| | |
|---|---|
| **Extinguishing media** | Non-flammable. Use any extinguishing media suitable for the surrounding fire. Cool exposed cylinders with water fog or spray from a protected location. |
| **Unsuitable media** | None known. |
| **Special hazards** | Cylinders heated in a fire may rupture violently due to thermal pressure rise. Pressure-relief devices may activate. |
| **Advice for firefighters** | Wear full bunker gear and self-contained breathing apparatus. Cool cylinders with water from a protected location until well after the fire is out. Move cool cylinders out of the path of the fire if it can be done safely. Do not approach cylinders suspected of being hot. |
| **Hazchem Code** | 2TE |

## 6. ACCIDENTAL RELEASE MEASURES

| | |
|---|---|
| **Personal precautions** | Evacuate the area. Ensure adequate ventilation. Do not enter confined or low-lying spaces without atmospheric monitoring. Use PPE as specified in Section 8. |
| **Environmental precautions** | Prevent gas from entering sewers, basements, work pits or any confined space where accumulation can be dangerous. |
| **Methods of cleanup** | If safe, close the cylinder valve to stop the leak. If irreparable, carefully move the cylinder to a safe, open, well-ventilated location and allow the gas to dissipate to atmosphere. Do not attempt to repair leaking valves or pressure-relief devices — return the cylinder to Puregas. |
| **Reference to other sections** | See Section 8 for exposure controls; Section 13 for disposal. |

## 7. HANDLING AND STORAGE

| | |
|---|---|
| **Safe handling** | Use only with adequate ventilation. Avoid breathing gas. Do not drag, drop, slide or roll cylinders — use a purpose-built cylinder trolley. Always fit the cylinder cap/guard during transport. Use equipment, regulators and hoses rated for the cylinder pressure. Open valves slowly. Close valves after each use and when empty. |
| **Safe storage** | Store cylinders upright in a secure, well-ventilated area at temperatures below 65 °C. Floor should be firm, level and constructed of non-combustible material (preferably concrete). Restrain cylinders to prevent toppling. Segregate from incompatible materials and ignition sources. Keep clear of heavy traffic areas and emergency exits. Comply with AS 4332. |
| **Specific end uses** | MIG/MAG welding shielding (pure or as component of a mix); beverage carbonation; food-grade applications; horticultural / greenhouse enrichment; fire suppression (specialised systems). |

## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

### Exposure standards (Safe Work Australia)

| Ingredient | TWA (ppm) | TWA (mg/m³) | STEL (ppm) | STEL (mg/m³) |
|---|---|---|---|---|
| Carbon Dioxide | 5000 | 9000 | 30000 | 54000 |

*Simple asphyxiants (argon, helium, nitrogen) have no assigned exposure standards. Maintain workplace oxygen ≥ 19.5 % at all times.*

### Engineering controls

Use only with adequate general or local exhaust ventilation. Where an inhalation risk exists, use mechanical extraction ventilation to maintain oxygen above 19.5 % v/v. Monitor confined spaces continuously with calibrated O■ detection.

### Personal protective equipment (PPE)

| | |
|---|---|
| **Eye / Face** | Safety glasses with side shields. Welding helmet with appropriate shade when welding. |
| **Hands** | Leather welding/handling gloves; insulated gloves when handling cold cylinders. |
| **Body** | Flame-retardant overalls and safety boots appropriate to the task. |
| **Respiratory** | Not normally required with adequate ventilation. For confined-space work or oxygen-deficient atmospheres, use SCBA or air-line respirator — filter respirators do not protect against asphyxiation. |

## 9. PHYSICAL AND CHEMICAL PROPERTIES

| | |
|---|---|
| **Appearance** | Colourless gas; under cylinder pressure exists as liquid in equilibrium with vapour. |
| **Odour** | Odourless at low concentrations; faintly pungent at high concentrations. |
| **pH** | ~ 3.7 in aqueous solution (carbonic acid). |
| **Boiling Point** | Not applicable at 1 atm — $CO_2$ sublimes directly from solid to gas below the triple point. |
| **Sublimation point** | –78.5 °C at 1 atm (no liquid phase below 5.2 bar). |
| **Triple point** | –56.6 °C at 5.2 bar. |
| **Critical point** | 31.1 °C at 73.8 bar. |
| **Flash Point** | Not relevant (non-flammable). |
| **Flammability** | Non-flammable. |
| **Lower / Upper Explosive Limit** | Not relevant. |
| **Vapour Pressure** | ~ 57 bar at 20 °C (liquid–vapour equilibrium). |
| **Vapour Density** | 1.53 (air = 1) — significantly heavier than air. |
| **Solubility in Water** | Soluble; forms carbonic acid. |
| **Auto-Ignition Temperature** | Not relevant (non-flammable). |

| | |
|---|---|
| **Decomposition Temperature** | ~ 2 000 °C (thermally very stable). |
| **Viscosity** | Not applicable (gas). |
| **Oxidising Properties** | Not classified as oxidising. |
| **Volatiles** | 100 % |

## 10. STABILITY AND REACTIVITY

| | |
|---|---|
| **Reactivity** | Generally inert; reacts with moisture to form carbonic acid which is mildly corrosive. |
| **Chemical stability** | Stable under normal conditions of storage and use. |
| **Hazardous reactions** | Polymerisation will not occur. |
| **Conditions to avoid** | Heat, direct sunlight, physical damage to cylinder. |
| **Incompatible materials** | Strong reducing agents, alkali metals (Li, Na, K), alkaline-earth metals (Mg, Ti, Zr) — exothermic reactions. Wet $CO_2$ is mildly corrosive to carbon steel — use stainless or other acid-resistant materials for fixed installations. |
| **Hazardous decomposition products** | None under normal conditions. |

## 11. TOXICOLOGICAL INFORMATION

| | |
|---|---|
| **Acute toxicity — inhalation** | Simple asphyxiant. Based on available data, classification criteria for acute toxicity are not met. |
| **Acute toxicity — skin** | Not irritating to skin. |
| **Acute toxicity — eye** | Not irritating to the eye. |
| **Acute toxicity — oral** | Not a relevant route of exposure (gas). |
| **Skin / Respiratory sensitisation** | Not classified as a sensitiser. |
| **Mutagenicity** | Not classified as a mutagen. |
| **Carcinogenicity** | Not classified as a carcinogen. |
| **Reproductive toxicity** | Not classified as a reproductive toxin. |
| **STOT — single exposure** | Asphyxiant. Over-exposure may result in dizziness, drowsiness, breathing difficulties and unconsciousness. |
| **STOT — repeated exposure** | Not classified as causing organ damage from repeated exposure. |
| **Aspiration hazard** | Not classified as causing aspiration. |

## 12. ECOLOGICAL INFORMATION

| | |
|---|---|
| **Ecotoxicity** | Not classified as harmful to aquatic life. |
| **Persistence and degradability** | Will dissipate rapidly in air. |
| **Bioaccumulative potential** | Not expected to bioaccumulate. |
| **Mobility in soil** | Volatile — will evaporate. |
| **Other adverse effects** | Not classified as an ozone-depleting substance. |

## 13. DISPOSAL CONSIDERATIONS

| | |
|---|---|
| **Waste disposal** | Return cylinders to Puregas or an authorised gas reseller for safe discharge and disposal of residual product. Do not dispose of cylinders to general or scrap-metal waste. |

| | |
|---|---|
| **Legislation** | Disposal of this product and any by-products must comply with Commonwealth, State and local environmental-protection and waste-management legislation. |

## 14. TRANSPORT INFORMATION

**CLASSIFIED AS DANGEROUS GOODS BY THE CRITERIA OF THE ADG CODE.**

| | Land (ADG) | Sea (IMDG/IMO) | Air (IATA/ICAO) |
|---|---|---|---|
| UN Number | 1013 | 1013 | 1013 |
| Proper Shipping Name | CARBON DIOXIDE | CARBON DIOXIDE | CARBON DIOXIDE |
| Transport Hazard Class | 2.2 | 2.2 | 2.2 |
| Packing Group | Not allocated | Not allocated | Not allocated |
| Hazchem / EmS | 2TE | F-C, S-V | — |

**Pictogram:** Class 2.2 — Non-Flammable Non-Toxic Gas

Special precautions: ensure cylinders are secured upright with valves protected; outlet relief devices must not be obstructed; segregate from flammables and oxidisers. Comply with the Australian Dangerous Goods Code (ADG 7.x) for road and rail transport. Not a Marine Pollutant.

## 15. REGULATORY INFORMATION

| | |
|---|---|
| **Safe Work Australia** | Classified hazardous according to Safe Work Australia criteria (Globally Harmonised System — GHS). |
| **Poisons Schedule (SUSMP)** | No poisons schedule number allocated. |
| **Inventory listings** | AICS (Australian Inventory of Chemical Substances): all components listed or exempt. |
| **Other Australian legislation** | AS 4332 (Storage and handling of gases in cylinders); WHS Regulations; ADG Code; State environmental-protection legislation. |

## 16. OTHER INFORMATION

| | |
|---|---|
| **Additional information** | Storage of significant quantities of gas cylinders must comply with AS 4332 and the relevant State / Territory Dangerous Goods legislation. Welding processes generate additional hazards (radiation, noise, fume, ozone) — perform a separate risk assessment. |
| **Application method** | Pressure regulator of suitable rating fitted to cylinder, with gas delivered to the point of use via a flowmeter at the manufacturer-recommended rate. |
| **PPE guidance** | PPE recommendations are a guide only. Final selection should consider method of application, working environment, quantities handled, and the effectiveness of engineering controls. |
| **Health effects from exposure** | Effects depend on frequency and duration of use, quantity, control measures, PPE used, and method of application. |

**Abbreviations**

| | |
|---|---|
| **ACGIH** | American Conference of Governmental Industrial Hygienists |
| **ADG** | Australian Dangerous Goods Code |
| **AICS** | Australian Inventory of Chemical Substances |
| **AS 4332** | Australian Standard — Storage and handling of gases in cylinders |

| | |
|---|---|
| **CAS #** | Chemical Abstracts Service registry number |
| **EC No.** | European Community Number |
| **GHS** | Globally Harmonised System of Classification and Labelling of Chemicals |
| **IATA** | International Air Transport Association |
| **ICAO** | International Civil Aviation Organisation |
| **IMDG/IMO** | International Maritime Dangerous Goods Code / International Maritime Organisation |
| **SCBA** | Self-Contained Breathing Apparatus |
| **STEL** | Short-Term Exposure Limit |
| **STOT** | Specific Target Organ Toxicity |
| **SUSMP** | Standard for the Uniform Scheduling of Medicines and Poisons |
| **SWA** | Safe Work Australia |
| **TWA** | Time-Weighted Average |

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*End of Safety Data Sheet. The information in this SDS is provided in good faith and is believed to be accurate at the date of issue. No warranty is given as to its completeness or accuracy. The user is responsible for satisfying themselves as to the suitability and completeness of this information for their own particular use.*