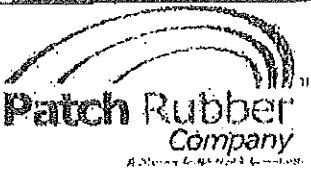


MATERIAL SAFETY DATA SHEET

Page 1 of 5

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION					
PRODUCT NAME: FAST DRY SELF VULCANIZING CEMENT		MSDS NUMBER: 0223			
PRODUCT NUMBER: 18-460, 18-451, 18-452, 88-B54, 88-855		DATE: 14 October 2010			
TRADE NAME: VULCANIZING CEMENT					
GENERAL USE: Adhesive					
CHEMICAL FAMILY: organics					
PRODUCT DESCRIPTION: Milky white, flammable liquid with a hydrocarbon odor.					
MANUFACTURER: Patch Rubber Company		DATE PREPARED: 14 October 2010			
ADDRESS (NUMBER, STREET, P.O. BOX): PO Box H		SUPERSEDES: 19 February 2010			
(CITY, STATE AND ZIP CODE): Roanoke Rapids, NC 27870		COUNTRY: USA			
TELEPHONE NUMBER (General Inquiries): (252) 536-2574		CHEMTEL 24-HOUR EMERGENCY TELEPHONE NUMBERS			
		ChemTel INC. 		1-800-255-3924 North America (Toll Free)	813-248-0585 International and Local Calls
SECTION 2: HAZARDOUS INGREDIENTS					
Hazardous Components	% (by Weight)	CAS #	EINECS #	Hazard Symbol	RISK PHRASES (Full Text Section 15)
Heptane	>90%	142-82-5	205-563-9	F, Xn, N	R11, 38, 50/53, 66, 67
(DiButylamine)bis(dibutylidithiocarbamate-S,S')zinc	1-5%	35884-05-0	262-774-6	None	Not Classified
NOTES: This Material Safety Data Sheet is prepared to comply with the United States Occupational Safety and Health Administration (OSHA) Hazard Communication Standard (29 CFR 1910.1200), the Canadian Workplace Hazardous Materials Information System (WHMIS), and European Union Directives. Hazard symbols and risk phrases are based on maximum listed concentration of each hazardous ingredient. Unlisted ingredients are not 'hazardous' per the OSHA Hazard Communication Standard (29 CFR 1910.1200), the Canadian Workplace Hazardous Materials Information System (WHMIS) or the European (GHS) directives and are considered trade secrets under US Federal Law (28CFR and 40CFR), Canadian Law (Health Canada Legislation), and European Union Directives.					
SECTION 3: HAZARDS IDENTIFICATION					
EMERGENCY OVERVIEW					
Flammable liquid, potentially hazardous vapours. Can cause serious or fatal complications if swallowed. Can cause eye and skin irritation upon contact. Inhalation of vapours can cause anesthetic effect leading to death in poorly ventilated areas. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Cancer Information: There is no information available. The chance of this material causing cancer is unknown. Developmental Information: There are no data available for assessing risk to the fetus from maternal exposure to this material.					
POTENTIAL HEALTH EFFECTS					
INHALATION:					
High concentrations are irritating to the respiratory tract. May cause headache, dizziness, nausea, vomiting and malaise. Intentional concentration and inhalation of heptane vapours may lead to nervous system damage.					
SKIN:					
Brief contact may cause slight irritation; prolonged contact may cause moderate irritation or dermatitis.					
EYES:					
High vapour concentration or contact may cause irritation and discomfort.					
INGESTION:					
May result in vomiting; aspiration of vomitus into the lungs must be avoided; DO NOT induce vomiting. Minute amounts aspirated into the lungs can produce severe lung injury, chemical pneumonia, pulmonary edema or death.					
Note to Physicians:					
Inhalation of high concentrations of this material, as could occur in enclosed spaces or during deliberate abuse, may be associated with cardiac arrhythmias. Sympathomimetic drugs may initiate cardiac arrhythmias in persons exposed to this material. This material is an aspiration hazard. Potential danger from aspiration must be weighed against possible oral toxicity (See Section 3 - Swallowing) when deciding whether to induce vomiting. Pre-existing disorders of the following organs (or organ systems) may be aggravated by exposure to this material: skin, lung (for example, asthma-like conditions). Individuals with pre-existing heart disorders may be more susceptible to arrhythmias (irregular heartbeats) if exposed to high concentrations of this material.					
CARCINOGENICITY:					
NTP? NO		IARC MONOGRAPHS? NO		OSHA REGULATED? NO	
CALIFORNIA, Prop.65?		Yes Benzene and Toluene, Cancer and Reproductive hazards.		ESIS NOTATION? NO	

MATERIAL SAFETY DATA SHEET

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PRODUCT NAME: FAST DRY SELF VULCANIZING CEMENT		MSDS NUMBER: 0223						
PRODUCT NUMBER: 18-452, 18-451, 18-452, 98-854, 98-855		DATE: 14 October 2010						
SECTION 4: FIRST AID MEASURES								
INHALATION: Remove affected person to fresh air; provide oxygen if breathing is difficult; if affected person is not breathing, administer CPR and seek emergency medical attention.								
EYES: Check for and remove contact lenses. Flush eyes with clear running water for 15 minutes while holding eyelids open; if irritation persists, seek medical attention. Do not use over-the-counter products except under physician directions.								
SKIN: Remove contaminated clothing; wash affected area with soap and water; launder contaminated clothing before reuse; if irritation persists, seek medical attention. The use of emollients may ease mild irritation from defatting of skin.								
INGESTION: DO NOT INDUCE VOMITING!!! If vomiting occurs spontaneously, keep head below hips to prevent aspiration of liquid into lungs. Seek immediate emergency medical attention; transport container with victim to assist with treatment.								
SECTION 5: FIRE FIGHTING MEASURES								
GENERAL HAZARDS: Product is flammable, with a flash point of -10° C (15° F). Ignited product will float on top of water. Products of combustion include compounds of carbon, hydrogen and oxygen, including carbon monoxide. Vapours may cause a flash fire or ignite explosively. Material is highly volatile and readily gives off vapors, which may travel along the ground or be moved by ventilation and ignited by pilot lights, other flames, sparks, heaters, smoking, electric motors, static discharge, or other ignition sources at locations distant from material handling point. Never use welding or cutting torch on or near drums (even empty) because product (even just residue) can ignite explosively.								
EXTINGUISHING MEDIA: Carbon dioxide, water fog, dry chemical, chemical foam. Avoid the use of streaming water, as this may spread fire.								
FIRE FIGHTING PROCEDURES: Firefighters must wear full facepiece self-contained breathing apparatus in positive pressure mode. Do not use solid stream of water since stream will scatter and spread fire. Fine water spray can be used to keep fire-exposed containers cool.								
UNUSUAL FIRE AND EXPLOSION HAZARDS: Closed containers can explode due to buildup of pressure when exposed to extreme heat. Do not use direct stream of water on pool fires as product may reignite on water surface; use of water fog to cool containers is acceptable.								
HAZARDOUS COMBUSTION PRODUCTS: Smoke, soot, fumes or vapours, oxides of carbon.								
SECTION 6: ACCIDENTAL RELEASE MEASURES								
STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: CAUTION - HIGHLY FLAMMABLE LIQUID - PRODUCT IS LIGHTER THAN WATER AND WILL FLOAT ON TOP OF WATER. Evacuate and ventilate area, remove all sources of sparks, ignition and open flames, and turn off electrical circuits in area. Wear personal protective equipment, including organic vapour respirator or self-contained breathing apparatus, as needed. Confine product and absorb into approved absorbent; place material into approved flammable waste containers for disposal; do not wash to sewer or waterway. Dikes may be needed for large spills. Treat used absorbent as flammable. For spills in excess of allowable limits (RQ) within the United States, notify the National Response Center at (800) 424-8802.								
SECTION 7: HANDLING AND STORAGE								
PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Keep container closed when not in use; protect containers from abuse; protect from extreme temperatures. CAUTION - FLAMMABLE - keep away from all sources of ignition. "Empty" containers may contain residue which may form explosive vapours. Do not weld or cut near empty container that has not been professionally reconditioned. Use nonsparking tools when opening and closing containers. Maintain well ventilated work areas to minimize exposure when handling this material.								
SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION								
HAZARDOUS COMPONENTS	NIOSH				ACGIH		OSHA	
	TWA ppm	TWA mg/m ³	STEL ppm	STEL mg/m ³	TWA ppm	TWA mg/m ³	STEL ppm	STEL mg/m ³
Heptane	85	350	NR	NR	400	1640	500	2050
(Diethylamine)bis(diethylthiocarbamate-S,S')zinc	NE	NE	NE	NE	NE	NE	NE	NE
NE - Not Established, NR - Not Reported Heptane - 500 ppm TWA in UK, 400 ppm TWA in Ireland. Carbon Black - 3.5 mg/m ³ TWA, 7 mg/m ³ STEL in UK and Ireland.								

MATERIAL SAFETY DATA SHEET

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PRODUCT NAME: FAST DRY SELF VULCANIZING CEMENT		MSDS NUMBER: 0223	
PRODUCT NUMBER: 10-400, 10-451, 10-462, 08-954, 08-955		DATE: 14 October 2010	
PERSONAL PROTECTION			
RESPIRATORY PROTECTION:			
Not required for normal work situations where adequate ventilation is provided. Use NIOSH or European EN-149 approved self contained, positive pressure respirators for emergencies and in situations where air may be displaced by vapours. Follow OSHA Std. 29CFR 1910.134 or corresponding EU Directives.			
PROTECTIVE GLOVES:			
Neoprene, butyl or nitrile rubber gloves with cuffs should be worn, especially if prolonged exposure is expected.			
EYE PROTECTION:			
Chemical safety goggles, preferably with side shields should be worn as a matter of proper industrial practice. Refer to 29 CFR 1910.133 within the US or European Standard EN166 within the EU.			
OTHER PROTECTIVE CLOTHING OR EQUIPMENT:			
Provide a safety eyewash nearby, in case of splash injury. Where extensive dermal exposure may be expected, either a chemical suit or a chemical apron will be needed. Neoprene is a good compromise material between chemical resistance, physical durability, and cost.			
WORK / HYGIENIC PRACTICES:			
Practice safe workplace habits. Minimize body contact with this, as well as all chemicals in general. Do not smoke, eat or drink while using the product. Wash hands with soap and water before smoking, eating, drinking or using toilet facilities. Launder contaminated clothing before re-use.			
SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES			
APPEARANCE AND ODOR		VAPOUR PRESSURE	
Milky white liquid, characteristic hydrocarbon odor		45 mm Hg @ 20° C (68°F)	
pH		SPECIFIC GRAVITY (WATER = 1)	
NA		0.708	
BOILING POINT		SOLUBILITY IN WATER	
93.3° C (200° F) @ 760mmHg		Negligible	
FLASH POINT		VISCOSITY	
(-10° C, 15° F)		NO	
FLAMMABLE LIMITS		VAPOUR DENSITY (AIR = 1)	
LEL: 1.10% UEL: 6.70%		3.5	
AUTOIGNITION TEMPERATURE		EVAPORATION RATE (Butyl Acetate = 1)	
203.0° C (399° F)		2.8	
SECTION 10: STABILITY AND REACTIVITY			
STABILITY		CONDITIONS TO AVOID:	
STABLE X		High temperatures, sparks, open flames, live electrical circuits.	
INCOMPATIBILITY (MATERIALS TO AVOID):			
oxidizers, strong acids			
HAZARDOUS DECOMPOSITION OR BYPRODUCTS:			
Decomposition will not occur if handled and stored properly. In case of a fire, oxides of carbon, hydrocarbons, fumes or vapours. Soot and smoke may be produced.			
HAZARDOUS POLYMERIZATION:		CONDITIONS TO AVOID:	
Will not occur.		None related to polymerization.	
SECTION 11: TOXICOLOGICAL INFORMATION			
Hazardous Components	CAS # EINECS n	LOSO of Ingredient (Specify Species and Route)	LOSO of Ingredient (Specify Species)
Heptane	142-82-5	NR	103 gm/m ³ /4 hour (inhalation, rat)
	205-683-8		
(Dibutylamine)bis(dibutylthiocarbamate-S,S')zinc	35884-05-0	NE	NE
	252-774-6		
No data are available on the adverse effects of this material on the environment. Neither COD nor BOD data are available. Based on the chemical composition of this product it is assumed that the mixture can be treated in an acclimatized biological waste treatment plant system in limited quantities. Heptane is considered to be harmful to the environment by the European Union.			

MATERIAL SAFETY DATA SHEET

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PRODUCT NAME: FAST DRY SELF VULCANIZING CEMENT		MSDS NUMBER: 0223
PRODUCT NUMBER: 18-450, 18-451, 18-452, 88-854, 88-855		DATE: 14 October 2010
SECTION 13: DISPOSAL CONSIDERATIONS		
WASTE DISPOSAL METHOD: Dispose of in accordance with Local, State, and Federal Regulations. This product may produce hazardous vapours in a closed disposal container creating a dangerous environment. Consult your local, state, or Federal Environmental Protection Agency before disposing of any chemicals. Do not flush to sanitary sewer or waterway. According to the European Waste Catalogue, waste codes are application specific and should be assigned by the user based on the application for which the product is used.		
SECTION 14: TRANSPORT INFORMATION		
PROPER SHIPPING NAME: Adhesives, Flammable, UN 1133		
DOT HAZARD CLASS / Pack Group: ORM-D Consumer Commodity (USA)	ATA HAZARD CLASS / Pack Group: Class 3, PG II	
REFERENCE: 49 CFR 172.101	IMDG HAZARD CLASS: 3	
UN / NA IDENTIFICATION NUMBER: UN 1133	RID/ADR Dangerous Goods Code: 3	
LABEL: Flammable	UN TDG Class / Pack Group: Class 3, PG II	
HAZARD SYMBOLS:  		Hazard Identification Number (HIN): 33
Note: Transportation Information provided is for reference only. Client is urged to consult CFR 49 parts 100 - 177, IMDG, IATA, EU, United Nations TDG, and WHMIS (Canada) TDG information manuals for detailed regulations and exceptions covering specific container sizes, packaging materials and methods of shipping.		
SECTION 15: REGULATORY INFORMATION		
TSCA (USA - Toxic Substance Control Act): Listed		
SARA TITLE III (USA - Superfund Amendments and Reauthorization Act):		
Acute Health: Yes	Chronic Health: Yes	
Fire: Yes	Sudden Release of Pressure: Yes*	
Reactive: No	* Containers may rupture and release contents.	
SARA 313 REPORTABLE INGREDIENTS: None reportable.		
CERCLA (USA - Comprehensive Response Compensation and Liability Act):		RC=24000 lbs (10880 kg) for product.
California Prop 65, Safe Drinking Water and Toxic Enforcement Act of 1986:		The following statement is made in order to comply with the California Safe Drinking Water and Toxic Enforcement Act of 1986: This product contains the following substance(s) known to the state of California to cause reproductive harm. BENZENE TOLUENE
State Right To Know: n-Heptane is listed as follows: NJ, PA, MA, RI		
CPR (Canadian Controlled Products Regulations):		This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR. WHMIS Hazard Class B2, D2B.
 		
IDL (Canadian Ingredient Disclosure List): Listed		
DSL / NDSL (Canadian Domestic Substances List / Non-Domestic Substances List):		Listed on CDSL.
EINECS (European Inventory of Existing Commercial Chemical Substances): Listed.		
WGK Water Quality Index: 1		
RISK PHRASES:	SYMBOL(S) REQUIRED FOR EU LABEL	SAFETY PHRASES:
R11 Highly flammable. R38 Irritating to skin. R50/53 Very toxic to aquatic organisms, may cause long term adverse effects in the aquatic environment. R65 Damaging to lungs when swallowed. R67 Vapours may cause drowsiness and dizziness.	      Flammable Environment Harmful	S9 Keep container in a well-ventilated place. S10 Keep away from sources of ignition S29 Do not empty into drains. S33 Take precautionary measures against static discharges. S60 This material and its container must be disposed of as hazardous waste. S61 Avoid release to the environment. Refer to special instructions / safety data sheets. S62 If swallowed, do not induce vomiting; seek medical advice immediately and show this label.

MATERIAL SAFETY DATA SHEET

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PRODUCT NAME: FAST DRY SELF VULCANIZING CEMENT		MSDS NUMBER: 0223	
PRODUCT NUMBER: 10-450, 10-451, 10-452, 98-054, 90-055		DATE: 14 October 2010	
SECTION 10: OTHER INFORMATION			
Legend: ACGIH - American Congress of Government Industrial Hygienists CAS - Chemical Abstracts Service EINECS - European Inventory of Existing Commercial Chemical Substances HMIS - Hazardous Materials Identification System IARC - International Agency for Research on Cancer NA - Not Available ND - Not Determined NE - Not Established NR - Not Reported NIOSH - National Institute for Occupational Safety and Health NTP - National Toxicology Program OSHA - Occupational Safety and Health Administration			
HMIS HAZARD RATINGS	HEALTH: FLAMMABILITY: PHYSICAL HAZARD: PERSONAL PROTECTIVE EQUIPMENT:	1 3 0 B	0 = INSIGNIFICANT 1 = SLIGHT 2 = MODERATE 3 = HIGH 4 = EXTREME
REVISION SUMMARY: Revised to USA (ANSI), EU, Canadian, and GHS standards 10/14/2010 Supersedes 2/19/2010 issue, JTV & LB.			
MSDS Prepared by: ChemTel Inc. 1305 North Florida Avenue Tampa, Florida USA 33602-2902 Toll Free North America 1-888-255-3924 Int'l +01 813-248-0573 Website: www.chemtelinc.com			
The information contained herein is believed to be accurate and is intended to be so. Data and calculations are based on information furnished by the manufacturer of the product and information of the components of the product. Users are advised to obtain a copy of the MSDS for the material in question and to read the entire MSDS for the material in question. The information is not intended to be used as a substitute for the manufacturer's instructions. The information is not intended to be used as a substitute for the manufacturer's instructions. The information is not intended to be used as a substitute for the manufacturer's instructions.			

Material Safety Data Sheet

Leland Limited Inc.
Product: Carbon dioxide
Revised on: Feb 21, 2012

1. Chemical Product and Company Identification

Product name : Carbon Dioxide (liquefied Carbon Dioxide)
Supplier : Leland Limited, Inc.
2614 South Clinton Ave.
South Plainfield, NJ 07080
1-908-668-1008 (9-5 EST)
Emergency calls : 1-800-424-9300 (Domestic)
(CHEMTREC) 1-703-527-3887 (International)

2. Hazards Identification

EMERGENCY OVERVIEW

CAUTION! High-pressure gas.

Can cause rapid suffocation.

Can increase respiration and heart rate.

May cause nervous system damage.

May cause frostbite.

May cause dizziness and drowsiness.

**Self-contained breathing apparatus may
be required by rescue workers.**

Odor: None

Threshold Limit Value : TLV-TWA, 5,000 ppm (ACGIH, 1998). TLV-TWA, 15 min STEL, 30,000 ppm.

Effects of a Single (acute) Overexposure : Inhalation - Carbon Dioxide gas is an asphyxiant with effects due to lack of oxygen. It is also physiologically active, affecting circulation and breathing. Moderate concentrations may cause headache, drowsiness, dizziness, stinging of the nose and throat, excitation, rapid breathing and heart rate, excess salivation, vomiting, and unconsciousness. Lack of oxygen can kill.
Skin Contact - No harm expected from vapor. Cold gas, or liquid or solid Carbon Dioxide may cause severe frostbite.
Swallowing - An unlikely route of exposure. This product is a gas at normal temperature and pressure.
Eye Contact - No harm expected from vapor. Cold gas, or liquid or solid Carbon Dioxide may cause severe frostbite.

Effects of Repeated (chronic) Overexposure : No harm expected.

Other Effects of Overexposure : Damage to retinal or ganglion cells and central nervous system may occur.

Medical Conditions Aggravated by Overexposure : The toxicology and the physical and chemical properties of Carbon Dioxide suggest that overexposure is unlikely to aggravate existing medical conditions.

Significant Laboratory Data with Possible Relevance to Human Health Hazard Evaluation : A single study has shown an increase in heart defects in rats exposed to 6% Carbon Dioxide in air for 24 hours at different times during gestation. There is no evidence that Carbon Dioxide is teratogenic in humans.

Carcinogenicity : Carbon Dioxide is not listed by NTP, OSHA, or IARC.

Material Safety Data Sheet

Leland Limited Inc.
Product: Carbon dioxide
Revised on: Feb 21, 2012

3. Composition, Information on Ingredients

Carbon Dioxide is supplied in cylinders as a liquid under its own vapor pressure, which varies depending on the temperature. It is non-toxic, non-flammable and heavier than air.

Single or Mixed	: Single
Chemical Name	: Carbon Dioxide
Content (vol%)	: 99.5 or more
Chemical Formula	: CO ₂
CAS Number	: 124-38-9
OSHA PEL	: 5,000 ppm
ACGIH TLV-TWA	: 5,000 ppm

4. First Aid Measures

No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

Inhalation	: Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.
Skin Contact	: For exposure to cold vapor or solid, immediately warm frostbite area with warm water not to exceed 105 °F (41 °C). In case of massive exposure, remove contaminated clothing while showering with warm water. Get medical attention immediately.
Frostbite	: Try to warm up the frozen tissues and seek medical attention.
Eye Contact	: Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.
Swallowing	: An unlikely route of exposure. This product is a gas at normal temperature and pressure.
Protective Measures before starting First Aid	: In an Carbon Dioxide leak, Oxygen concentration may be low. Before attempting first aid, ventilate the area thoroughly or wear a respirator.
Notes to Physician	: There is no specific antidote. This product is inert. Treatment of overexposure should be directed at the control of symptoms and the clinical condition.

5. Fire Fighting Measures

Flammability of the Product	: Non-flammable
Extinguishing Media	: Carbon Dioxide cannot catch fire. Use extinguishing media for surrounding fire.
Special Fire Fighting Procedures	: CAUTION! High-pressure gas. Evacuate all personnel from danger area. Immediately deluge cylinders with water from maximum distance until cool, then move them away from fire area if without risk. Self-contained breathing apparatus may be required by rescue workers. On-site fire brigades must comply with OSHA 29 CFR 1910.156.

Material Safety Data Sheet

Leland Limited Inc.
Product: Carbon dioxide
Revised on: Feb 21, 2012

Unusual Fire and Explosion Hazards : Carbon Dioxide cannot catch fire. Heat of fire can build pressure in cylinder and cause it to rupture.
Recommended storage temperature: 0 ° C to +40 ° C.

Hazardous Combustion Products : None known.

6. Accidental Release Measures

Steps to be taken if Material is Released or Spilled : CAUTION! High-pressure liquid and gas. Carbon Dioxide is an asphyxiant. Lack of oxygen can kill. Evacuate all personnel from danger area. Use self-contained breathing apparatus where needed. Shut off leak / flow if you can do so without risk. Ventilate area or move cylinder to a well-ventilated area. Test for sufficient oxygen, especially in confined spaces, before allowing reentry.

Protectors : If necessary, wear a respirator.
If oxygen concentration is low, do not enter the area unprotected.

Environmental Affects : Carbon Dioxide does not adversely affect the environment.

Waste Disposal Method : Discard any product, residue, disposable container or liner in an environmentally acceptable manner, in full compliance with federal, state, and local regulations. If necessary, call your local disposal authority for assistance.

7. Handling and Storage

Handling : Protection of Carbon Dioxide users
Suffocation
Where large amounts of Carbon Dioxide are used, ensure sufficient ventilation.
Handling of cylinders
Handle cylinders carefully.
Before using gas, confirm the name of the gas by checking the mark or the other items on the cylinder.
Feed gas via a pressure regulator, not directly.
Use only specialized pressure regulators for Carbon Dioxide.
Before connecting a pressure regulator, check the thread type.
Before using a gas cylinder, check the pressure regulator, hoses, pipes, joints, etc., for leakage.
Do not refill cylinders.
Do not modify or erase marks or other items on cylinders. Do not peel off labels on cylinders.
Do not use gas cylinders in electric circuits.
Do not use burners or the like to directly heat the cylinder.
Do not touch dry ice with the bare hands because it has an extremely low temperature.

Others
Do not use Carbon Dioxide in place of compressed air.

Fire or Explosion Prevention
Carbon Dioxide is Non Flammable. No special measures are needed.

Material Safety Data Sheet

Leland Limited Inc.
Product: Carbon dioxide
Revised on: Feb 21, 2012

Dust Prevention

No special measures are needed.

Storage : Chemical substances that should not be mixed with Carbon Dioxide:
None

Storage Conditions
Keep Carbon Dioxide away from fire and spark sources.
Do not store cylinders near electric lines or grounding.
Store cylinders in a dry and well ventilated area.
Keep cylinders away from corrosive fluid.
Keep cylinders away from direct sunlight at an ambient temperature of 0 to 40 °C (32 to 104 °F).
Do not expose cylinders to rough handling or falling.
Control oxygen concentration in storage areas at 18 vol% or more.

8. Exposure Controls and Personal Protection

Engineering Controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Personal Protection

Eyes : To protect eyes, wear goggles/safety glasses.

Respiratory Protection : Use air-purifying or air-supplied respirators, as appropriate, where local or general exhaust ventilation is inadequate during a release of gas. Adequate ventilation must keep worker exposure below applicable TLVs and ensure greater than 19.5% oxygen is present. An air-supplied respirator must be used in confined spaces. Respiratory protection must conform to OSHA rules as specified in 29 CFR 1910.134.

Hands : When handling Carbon Dioxide cylinders, wear leather gloves.

Skin and Body : Not needed.

Other : Protective equipment for cylinder handling, select in accordance with OSHA 29 CFR 1910.132 and 1910.133.

9. Physical and Chemical Properties

Physical state : Liquid @ <31.1 °C (88 °F), otherwise dense vapor

Color : Colorless

Odor : Odorless

Explosiveness : Non-flammable

Molecular Weight : 44.01 g/mole

Specific gravity : 1.53 (Air=1)

Boiling/Sublimation point : -78.5 °C (-109.3 °F)

Triple point : -56.6 °C (-69.9 °F) @ 0.518 MPa

Critical point : 31.1 °C (88 °F) @ 7.38 MPa

Gas Density : 1.98 g/L (@ 0 °C, 0.1013 MPa (1 atm))

Liquid Density : 770 g/L (@ 20 °C, 5.67 MPa (56 atm))

Vapor Pressure : 5.7 MPa (830 psig) @ 21.1 °C (70 °F)

Solubility in water : 0.90 CO₂/H₂O @ 20 °C (68 °F)

Material Safety Data Sheet

Leland Limited Inc.
Product: Carbon dioxide
Revised on: Feb 21, 2012

10. Stability and Reactivity

Stability and Reactivity : This product is stable.
Hazardous Decomposition : Under normal conditions of storage and use, hazardous decomposition products should not be produced.
Hazardous Polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.
Conditions to Avoid : None currently known.

11. Toxicological Information

Acute toxicity : No known toxicological effects from this product.
Inhalation : Inhalation:
The gas is low in inhalation toxicity but causes oxygen deficiency if concentration is high.

Concentration(vol%)	Effect
0.04	Normal air
0.5	Limit of long-term safety (TLV)
1.5	Tolerable for an extended time without affecting operability and basic physiology, but calcium and phosphorus metabolism may be affected in some cases.
2	Respiration becomes deeper.
3	Operability drops. Physiological changes appear in variations in blood pressure, heartbeat, and other factors.
4	Respiration becomes much deeper. Higher breathing, slight gasping. Considerable degree of discomfort.
5	Extreme difficulty in breathing; serious gasping intolerable for most people; some feeling of nausea. Toxicosis occurs after 30 minutes exposure.
7 - 9	Limit of tolerance, resulting in violent gasping. In about 15 minutes, the subject loses consciousness.
10 - 11	Disabled regulation; unconsciousness in about 10 minutes.
15 - 20	Much more serious symptoms are seen, but not lethal within an hour.
25 - 30	Respiration weakens, blood pressure drops, resulting in coma, lost reflexes, and paralysis. Death occurs in some hours.

Local Physical Effects on : None
Skin, Eyes, etc.
Sensitization : None

Material Safety Data Sheet

Leland Limited Inc.
Product: Carbon dioxide
Revised on: Feb 21, 2012

Chronic or Long-term Toxicity : None

12. Ecological Information

Global warming potential (GWP) : 1
Global Warming Potential (GWP)
Index detailing effects on global warming
Carbon Dioxide does not contain any Class I or II ozone-depleting chemicals.

13. Disposal Considerations

Disposal of Carbon Dioxide : Gradually release in open air, because if released indoors, it may cause simple suffocation, even though the toxicity is low.
Disposal of Cylinders : If gas remains in cylinders, release gas with proper equipment and dispose of cylinders as incombustible waste.
For empty cylinders, check for a puncture hole and dispose of as incombustible waste.
Do not dispose of cylinders without first checking that all gas has been released. Empty cylinder shells are 100% recyclable steel.

14. Transport Information

DOT / IMO Shipping Name : Carbon Dioxide
Identification Number : UN 1013
Shipping Label(s) : Nonflammable gas
Hazard Class : 2.2
Placard (When required) : Nonflammable gas
Special Shipping Information : See CFR 49, 172.101, 173.306 for exceptions of labeling.

15. Regulatory Information

The following selected regulatory requirements may apply to this product. Not all such requirements are identified. Users of this product are solely responsible for compliance with all applicable federal, state, and local regulations.

U.S. Federal Regulations : EPA (Environmental Protection Agency)
CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (40 CFR Parts 117 and 302):
Reportable Quantity (RQ): None
SARA: Superfund Amendment and Reauthorization Act:
Sections 302/304: Require emergency planning based on Threshold Planning Quantity (TPQ) and release reporting based on Reportable Quantities (RQ) of extremely hazardous substances (40 CFR Part 355):
Threshold Planning Quantity (TPQ): None
Extremely Hazardous Substances (40 CFR 355): None
Sections 311/312: Require submission of Material Safety Data Sheet (MSDSs) and chemical inventory reporting with identification of EPA hazard categories. The hazard categories for this products are as follows:

Material Safety Data Sheet

Leland Limited Inc.
Product: Carbon dioxide
Revised on: Feb 21, 2012

IMMEDIATE: No
DELAYED: No

PRESSURE: Yes
REACTIVITY: No
FIRE: No

Sections 313: Requires submission of annual reports of release of toxic chemicals that appear in 40 CFR Part 372.

Carbon Dioxide does not require reporting under Section 313.

40 CFR 68: Risk Management Program for Chemical Accidental Release Prevention: Requires development and implementation of risk management programs at facilities that manufacture, use, store, or otherwise handle regulated substances in quantities that exceed specified thresholds.

Carbon Dioxide is not listed as a regulated substance.

TSCA: Toxic Substances Control Act: Carbon Dioxide is listed on the TSCA inventory applicable in some states.

OSHA (Occupational Safety and Health Administration):

29 CFR 1910.119: Process Safety Management of Highly Hazardous Chemicals: Requires facilities to develop a process safety management program based on Threshold Quantities (TQ) of highly hazardous chemicals.

Carbon Dioxide is not listed in Appendix A as a highly Hazardous chemical.

State Regulations

: **California:** This product is not listed by California under the Safe Drinking Water Toxic Enforcement Act of 1986 (Proposition 65).
Pennsylvania: This product is subject to the Pennsylvania Worker and Community Right-To-Know Act (35 P.S. Sections 7301-7320).

16. Other Information

Hazard Rating Systems

: NFPA Ratings

Health = 1
Flammability = 0
Reactivity = 0
Special = SA*

HMIS Ratings

Health = 0
Flammability = 0
Reactivity = 0

*(CGA recommends this rating to designate Simple Asphyxiant.)

Notice to reader

: This Material Safety Data Sheet (MSDS) is prepared based on the latest materials and data. It may be subject to change when new data is obtained. The MSDS state precautions assuming that the product is used under normal conditions. Uses under special conditions should take these conditions into account to ensure safety. While the MSDS has been prepared as comprehensively as possible, we cannot guarantee its applicability or effectiveness under all possible conditions or applications.