

MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards

PART I *What is the material and what do I need to know in an emergency?*

1. PRODUCT IDENTIFICATION

CHEMICAL NAME; CLASS: **DICHLORODIFLUOROMETHANE - CCl₂F₂**
HALOCARBON 12

Document Number: 001018

PRODUCT USE: For general analytical/synthetic chemical uses.

SUPPLIER/MANUFACTURER'S NAME: Ideal Gases, Inc

ADDRESS

14056 Fort Street
Southgate, MI 48195

EMERGENCY PHONE: 1-734-365-7192
1-313-492-8656

DATE OF PREPARATION 4/21/2010

2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	mole %	EXPOSURE LIMITS IN AIR					
			ACGIH		OSHA		IDLH ppm	OTHER
			TLV ppm	STEL ppm	PEL ppm	STEL ppm		
Dichlorodifluoromethane	75-71-8	100	1000 A4(Not Classifiable as a Human Carcinogen)	NE	1000	NE	15,000	NIOSH REL: 1000 ppm TWA DFG MAK: 1000 ppm

NE = Not Established

C = Ceiling Limit

See Section 16 for Definitions of Terms Used

NOTE: All WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-1993 format.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: Dichlorodifluoromethane is a colorless, non-flammable, liquefied gas with a slightly ethereal odor. Dichlorodifluoromethane can cause central nervous system depression after inhalation exposures. Symptoms of such overexposure can include drowsiness, fatigue, and weakness. At high concentrations, the gas can act as an asphyxiant, by displacing oxygen; therefore, exposure to high concentrations of this gas can be fatal. Frostbite can be caused by contact with rapidly expanding gases or the liquefied gas. This gas is not flammable or reactive in normal emergency response situations. However, if involved in a fire, Dichlorodifluoromethane can decompose to produce toxic gases (e.g., hydrogen fluoride, phosgene).

SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE:

The most significant route of overexposure for Dichlorodifluoromethane is by inhalation. The following paragraphs describe symptoms of exposure by route of exposure.

INHALATION: Exposures to high concentrations of this gas (above 10,000 ppm) may cause central nervous system depression and irritation of the nose, throat and upper respiratory system. Effects of such overexposure can include light-headedness, giddiness, shortness of breath, and in extreme cases, irregular heartbeats, cardiac arrest, and death. At concentrations of 40,000 ppm symptoms of exposure include slurred speech, a tingling sensation, humming in the ears, and apprehension. At 100,000 ppm, symptoms of incoordination can appear. All symptoms all more pronounced as the concentration of Dichlorodifluoromethane increases.

Deliberate abuse of Dichlorodifluoromethane by aerosol “sniffing” and use or misuse of bronchodilator aerosols have resulted in death. The cause of death is usually related to irregular heartbeat leading to cardiac arrest. These effects have not been reported in the workplace.

High concentrations of this gas can cause an oxygen-deficient environment. Individuals breathing such an atmosphere may experience symptoms which include headaches, ringing in ears, dizziness, drowsiness, unconsciousness, nausea, vomiting, and depression of all the senses. The skin of a victim of overexposure may have a blue color. Under some circumstances of overexposure, death

may occur. The effects associated with various levels of oxygen are as follows:

CONCENTRATION

- 12-16% Oxygen:
- 10-14% Oxygen:
- 6-10% Oxygen:
- Below 6%:

SYMPTOMS OF EXPOSURE

- Breathing and pulse rate increased, muscular coordination slightly disturbed.
- Emotional upset, abnormal fatigue, disturbed respiration.
- Nausea and vomiting, collapse or loss of consciousness.
- Convulsive movements, possible respiratory collapse, and death.



OTHER POTENTIAL HEALTH EFFECTS: Contact with liquid or rapidly expanding gases (which are released under high pressure) may cause frostbite. Symptoms of frostbite include change in skin color to white or grayish-yellow. The pain after such contact can quickly subside.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in **Lay Terms**. Overexposure to Dichlorodifluoromethane may cause the following health effects:

ACUTE: The most significant hazard associated with Dichlorodifluoromethane is inhalation of high concentrations of Dichlorodifluoromethane. Such overexposure can cause symptoms of central nervous system depression and of oxygen deficiency. Symptoms of such exposures include respiratory difficulty, ringing in ears, headaches, dizziness, indigestion, nausea, and, possible death. Contact with liquid or rapidly expanding gases may cause frostbite.

CHRONIC: Prolonged contact with the skin may cause defatting or dryness of the skin. There are currently no confirmed adverse health effects on humans associated with chronic exposure to this compressed gas. However, Dichlorodifluoromethane may cause cardiac sensitization, permanent neurological abnormalities, and lung damage. See Section 11 (Toxicological Information) for additional information.

TARGET ORGANS: Respiratory system, central nervous system, cardio-vascular system.

HAZARDOUS MATERIAL INFORMATION SYSTEM			
HEALTH		(BLUE)	1
FLAMMABILITY		(RED)	0
REACTIVITY		(YELLOW)	0
PROTECTIVE EQUIPMENT			B
EYES	RESPIRATORY	HANDS	BODY
	See Section 8		See Section 8
For routine industrial applications			

See Section 16 for Definition of Ratings

PART II *What should I do if a hazardous situation occurs?*

4. FIRST-AID MEASURES

RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO DICHLORODIFLUOROMETHANE WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus and Personal Protective equipment should be worn.

Remove victim(s) to fresh air, as quickly as possible. Trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation, if necessary. Only trained personnel should administer supplemental oxygen.

In case of frostbite, place the frostbitten part in warm water. **DO NOT USE HOT WATER.** If warm water is not available, or is impractical to use, wrap the affected parts gently in blankets. Alternatively, if the fingers or hands are frostbitten, place the affected area in the armpit. Encourage victim to gently exercise the affected part while being warmed. Seek immediate medical attention.

Victim(s) must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take copy of label and MSDS to physician or other health professional with victim(s).

5. FIRE-FIGHTING MEASURES

FLASH POINT: Not applicable.

AUTOIGNITION TEMPERATURE: Not applicable.

FLAMMABLE LIMITS (in air by volume, %):

Lower (LEL): Not applicable.

Upper (UEL): Not applicable.

FIRE EXTINGUISHING MATERIALS: Non-flammable gas. Use extinguishing media appropriate for surrounding fire.

Water Spray: YES

Carbon Dioxide: YES

Dry Chemical: YES

Halon: YES

Foam: YES

Other: Any "ABC" Class.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Although Dichlorodifluoromethane is a non-flammable gas, it can present some health hazards to firefighters. When involved in a fire, this material may decompose and produce toxic gases (e.g., phosgene, hydrogen fluoride, hydrogen chloride, and carbonyl fluoride). Dichlorodifluoromethane does not burn; however, containers, when involved in fire, may rupture or burst in the heat of the fire.

Explosion Sensitivity to Mechanical Impact: Not sensitive.

Explosion Sensitivity to Static Discharge: Not sensitive.

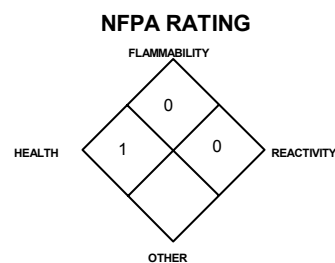
SPECIAL FIRE-FIGHTING PROCEDURES: Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. In the event of fire, cool containers of Dichlorodifluoromethane with water to prevent failure. Use a water spray or fog to reduce or direct vapors. If unruptured cylinders are exposed to heat, the cylinder may rupture or burst and release the contents. It may be prudent to remove potentially heat-exposed cylinders from the area surrounding a fire, if it is safe for fire-fighters to do so.

6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of an accidental release, evacuate all personnel upwind and away from affected area, protect people, and respond with trained personnel.

Minimum Personal Protective Equipment should be **Level B: mechanical resistant gloves and Self-Contained Breathing Apparatus.** Allow the gas to dissipate. Monitor the surrounding area for Dichlorodifluoromethane and oxygen. Colorimetric tubes can be used to detect the presence of Dichlorodifluoromethane. Colorimetric tube readings should indicate that Dichlorodifluoromethane is not present above levels indicated in Section 2 (Composition and Information on Ingredients) before non-emergency personnel are permitted to re-enter the area. The atmosphere must have at least 19.5 percent oxygen before personnel can be allowed in the area without Self-Contained Breathing Apparatus.

Attempt to close the main source valve prior to entering the area. If this does not stop the release (or if it is not possible to reach the valve), allow the gas to release in-place or remove it to a safe area and allow the gas to be released there.



See Section 16 for Definition of Ratings

PART III *How can I prevent hazardous situations from occurring?*

7. HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting Dichlorodifluoromethane IN YOU. Do not eat or drink while handling chemicals. Be aware of any signs of dizziness or fatigue; exposures to fatal concentrations of Dichlorodifluoromethane could occur without any significant warning symptoms.

STORAGE AND HANDLING PRACTICES: Cylinders should be stored in dry, well-ventilated areas away from sources of heat. Compressed gases can present significant safety hazards. Store containers away from heavily trafficked areas and emergency exits. Post "No Smoking or Open Flames" signs in storage or use areas. Do not use Dichlorodifluoromethane with or near incompatible chemicals, such as the following: sodium, potassium, calcium, zinc, and magnesium, powdered aluminum. Acceptable materials for construction for equipment used in the handling of Dichlorodifluoromethane include most commonly used metals (steel, cast iron, brass, copper, tin, lead).

SPECIAL PRECAUTIONS FOR HANDLING GAS CYLINDERS: Protect cylinders against physical damage. Store in cool, dry, well-ventilated area, away from sources of heat, ignition and direct sunlight. Do not allow area where cylinders are stored to exceed 52°C (125°F). Use a check valve or trap in the discharge line to prevent hazardous backflow. Post "No Smoking or Open Flame" signs in storage and use areas. Cylinders should be stored upright and be firmly secured to prevent falling or being knocked over. Cylinders can be stored in the open, but in such cases, should be protected against extremes of weather and from the dampness of the ground to prevent rusting. Never tamper with pressure relief devices in valves and cylinders. The following rules are applicable to work situations in which cylinders are being used:

Before Use: Move cylinders with a suitable hand-truck. Do not drag, slide or roll cylinders. Do not drop cylinders or permit them to strike each other. Secure cylinders firmly. Leave the valve protection cap in-place (if provided), until cylinder is ready for use.

During Use: Use designated CGA fittings and other support equipment. Do not use adapters. Do not heat cylinder by any means to increase the discharge rate of the product from the cylinder. Use check valve or trap in discharge line to prevent hazardous backflow into the cylinder. Do not use oils or grease on gas-handling fittings or equipment.

After Use: Close main cylinder valve. Replace valve protection cap (if provided). Mark empty cylinders "EMPTY".

NOTE: Use only DOT or ASME code containers. Close valve after each use and when empty. Cylinders must not be recharged except by or with the consent of owner. For additional information refer to the Compressed Gas Association Pamphlet P-1, *Safe Handling of Compressed Gases in Containers*. Additionally, refer to CGA Bulletin SB-2 "Oxygen Deficient Atmospheres".

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain application equipment is locked and tagged-out safely. Purge gas handling equipment with inert gas (e.g., nitrogen) before attempting repairs.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation. Local exhaust ventilation is preferred, because it prevents Dichlorodifluoromethane dispersion into the work place by eliminating it at its source. If necessary, the work area should be monitored for the level of oxygen.

RESPIRATORY PROTECTION: Maintain Dichlorodifluoromethane levels below the limits indicated in Section 2 (Composition and Information on Ingredients) and oxygen levels above 19.5% in the workplace. Use supplied air respiratory protection during emergency response to a release of Dichlorodifluoromethane or if oxygen levels are below 19.5%. If respiratory protection is required, follow the requirements of the Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), or equivalent State standards. The following NIOSH respiratory protection recommendations for Dichlorodifluoromethane in air are provided for additional information.

CONCENTRATION

UP TO 10,000 ppm:

UP TO 15,000 ppm:

RESPIRATORY EQUIPMENT

Supplied Air Respirator (SAR).

SAR operated in a continuous-flow mode; or full-facepiece Self-Contained Breathing Apparatus (SCBA); or full-facepiece SAR.

EMERGENCY OR PLANNED ENTRY INTO UNKNOWN CONCENTRATIONS OR IDLH CONDITIONS: Positive pressure, full-facepiece SCBA; or positive pressure, full-facepiece SAR with an auxiliary positive pressure SCBA.

ESCAPE: Gas mask with organic vapor canister; or escape-type SCBA.

NOTE: The IDLH concentration for Dichlorodifluoromethane is 15,000 ppm.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

EYE PROTECTION: Splash goggles or safety glasses, for protection from rapidly expanding. Face-shields should be worn if contact with the liquefied gas is anticipated.

HAND PROTECTION: Wear mechanical resistant gloves when handling cylinders of Dichlorodifluoromethane. Wear Viton or rubber gloves when using Dichlorodifluoromethane.

BODY PROTECTION: Use body protection appropriate for task. Transfer of large quantities under pressure may require protective equipment appropriate to protect employees from splashes of liquefied product.

9. PHYSICAL and CHEMICAL PROPERTIES

VAPOR DENSITY: 5.056 kg/m³ (0.316 lb/ft³)

SPECIFIC GRAVITY(air = 1): 4.2

SOLUBILITY IN WATER: Slightly.

EVAPORATION RATE (nBuAc = 1): Not applicable.

VAPOR PRESSURE (psia): 84.9

ODOR THRESHOLD: Not determined.

COEFFICIENT WATER/OIL DISTRIBUTION: Log P_{oct} 2.16; Log K_{ow} = 2.16.

APPEARANCE AND COLOR: Colorless, non-flammable gas with a slightly ethereal odor.

HOW TO DETECT THIS SUBSTANCE (warning properties): There are no distinct warning properties for Dichlorodifluoromethane. In terms of leak detection, fittings and joints can be painted with a soap solution to detect leaks, which will be indicated by a bubble formation.

10. STABILITY and REACTIVITY

STABILITY: Stable.

DECOMPOSITION PRODUCTS: If Dichlorodifluoromethane is exposed to fire, it may decompose yielding toxic products (e.g., hydrogen fluoride, phosgene, hydrogen chloride, carbonyl fluoride).

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: The following materials are not compatible with Dichlorodifluoromethane: alkaline, alkaline earth metals, and other reactive chemicals, (e.g., sodium, potassium, calcium, magnesium, powdered aluminum, and zinc). Silver and copper-bearing alloys can act as catalysts for decomposition of Dichlorodifluoromethane at high temperatures.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Avoid contact with incompatible materials. Cylinders exposed to high temperatures or direct flame can rupture or burst.

PART IV *Is there any other useful information about this material?*

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: The following information is available for Dichlorodifluoromethane.

TCLo (inhalation, human) = 200,000 ppm/30 minutes; eye, pulmonary, liver

LC50 (inhalation, rat) = 80 pph/30 minutes

LC50 (inhalation, mouse) = 76 pph/30 minutes

LC50 (inhalation, rabbit) = 80 pph/30 minutes

LC50 (inhalation, guinea pig) = 80 pph/30 minutes

SHORT-TERM INHALATION: Dichlorodifluoromethane has very low acute toxicity and acts a weak narcotic. Deaths occurred in rats, but not in guinea pigs after 2-hour exposure at 60% Dichlorodifluoromethane. In various other experiments, rats, guinea pigs, and cats all survived exposures to concentrations as high as 30%-8-% for several hours. It was found that Dichlorodifluoromethane produced respiratory-circulatory effects including respiratory depression, bronchioconstriction and tachycardia (abnormal rapidity of heart action) in concentrations of 5-10%. No pathologic changes were observed in guinea pigs, rats, cats, and dogs following four weeks of 3.5 hour exposures at 10%. Mice exposed at 4% 30 minutes a day for 3-6 weeks showed some weak pathology.

SKIN IRRITATION: No significant irritation was observed in rats and rabbits treated with a 30/70 mixture of Dichlorodifluoromethane and trichloromethane.

EYE IRRITATION: No significant irritation was observed in rabbits treated with a 30/70 mixture of Dichlorodifluoromethane and trichloromethane.

EFFECTS ON CARDIOVASCULAR SYSTEM: The cardiac sensitization potential of Dichlorodifluoromethane is considered moderate. Five out of 12 dogs exposed to 5% for 5 minutes showed evidence of cardiac arrhythmia. Cardiac sensitization can be induced with endogenous epinephrine at levels of 10-80%. Concentrations of 5-25% cause rapid heartbeat, and high blood pressure in dogs and monkeys.

LONG-TERM INHALATION: Rats, monkeys, dogs, rabbits, and guinea pigs were exposed to 810 ppm Dichlorodifluoromethane 24 hours/day for 90 days. There were no deaths and the only pathologic changes observed was in the liver of exposed guinea pigs. At exposure levels of 20%, there was an occurrence of generalized tremors, slight blood changes, and signs of mild narcosis.

11. TOXICOLOGICAL INFORMATION (Continued)

SUSPECTED CANCER AGENT: Dichlorodifluoromethane is listed by ACGIH as TLV-A4 (Not Classifiable as a Human Carcinogen). Dichlorodifluoromethane is not found on the following lists: FEDERAL OSHA Z LIST, IARC, NTP, CAL/OSHA and therefore is not considered to be, nor suspected to be a cancer-causing agent by these agencies. Studies on rats (fed 3000 ppm for 2 years) have not shown any carcinogenic effects.

IRRITANCY OF PRODUCT: Dichlorodifluoromethane is not irritating; however, contact with rapidly expanding gases can cause frostbite to exposed tissue.

SENSITIZATION TO THE PRODUCT: Dichlorodifluoromethane is not known to cause sensitization in humans upon prolonged or repeated exposure.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of Dichlorodifluoromethane on the human reproductive system.

Mutagenicity: No mutagenicity effects on humans have been described for Dichlorodifluoromethane. The following information has been obtained during clinical studies: Dichlorodifluoromethane was produced negative results in bacterial tests and cultured mammalian cells.

Embryotoxicity: Dichlorodifluoromethane has not been reported to cause embryotoxic effects.

Teratogenicity: No teratogenicity effects on humans have been described for Dichlorodifluoromethane. The following information has been obtained during clinical studies. Tetrology studies in rats and rabbits were negative.

Reproductive Toxicity: No reproductive toxicity effects on humans have been described for Dichlorodifluoromethane.

*A **mutagen** is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generation lines. An **embryotoxin** is a chemical which causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A **teratogen** is a chemical which causes damage to a developing fetus, but the damage does not propagate across generational lines. A **reproductive toxin** is any substance which interferes in any way with the reproductive process.*

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Conditions relating to the target organs may be aggravated by overexposures to Dichlorodifluoromethane. See Section 3 (Hazard Identification) for information on these conditions.

RECOMMENDATIONS TO PHYSICIANS: Administer oxygen, if necessary. Treat symptoms and eliminate exposure. If necessary, administer lung function tests and Holter monitor (special 24 hour EKG to look for irregular heartbeat). Epinephrine or other sympathomimetic amines and adrenergic activators should not be used, since they may sensitize the heart for development of arrhythmias.

BIOLOGICAL EXPOSURE INDICES (BEIs): Currently, Biological Exposure Indices (BEIs) are not applicable for Dichlorodifluoromethane.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL STABILITY: This gas will be dissipated rapidly in well-ventilated areas. Dichlorodifluoromethane is a chlorofluorocarbon (CFC) compound. Chlorofluorocarbon compounds have been implicated in the possible depletion of the stratospheric ozone, via a series of complex chemical reactions which occur in the upper atmosphere. Atmospheric ozone is essential in protecting plants and animals from potentially harmful ultraviolet-light exposures. All work practice must be directed at eliminating environmental contamination. Additional environmental data are available for Dichlorodifluoromethane as follows:

Solubility: 0.28g/L water at 25°C, 1 atm. Log K_{ow} = 2.16. Virtually inert; volatilizes rapidly. Biological half-life: distribution half-life averages 13-14 seconds; elimination half-life is 1.5 hours, because of slower release from fat stores. Biodegradation: No significant. Bioconcentration: Lipophilic; bioaccumulation may occur with constant exposure.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: Any adverse effect on animals would be related to adverse effects on the central nervous system and to exposure to oxygen deficient environments. The symptoms experienced by over-exposed animals would be similar to those described for exposed humans. No adverse effect is anticipated to occur to plant-life, except for frost produced in the presence of rapidly expanding gases.

EFFECT OF CHEMICAL ON AQUATIC LIFE: No evidence is currently available on the effects of Dichlorodifluoromethane on aquatic life.

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Product removed from cylinder must be disposed of in accordance with appropriate U.S. Federal, State and local regulations or with regulations of Canada and its Provinces. Return cylinders with residual product to Airgas, Inc. Do not dispose of locally.

14. TRANSPORTATION INFORMATION

THIS MATERIAL IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

PROPER SHIPPING NAME: Dichlorodifluoromethane
HAZARD CLASS NUMBER and DESCRIPTION: 2.2 (Nonflammable Gas)
UN IDENTIFICATION NUMBER: UN 1028
PACKING GROUP: Not Applicable
DOT LABEL(S) REQUIRED: Nonflammable Gas
NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2000): 126
MARINE POLLUTANT: Dichlorodifluoromethane is not classified by the DOT as a Marine Pollutant (as defined by 49 CFR 172.101, Appendix B).

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS. Use the above information for the preparation of Canadian Shipments.

15. REGULATORY INFORMATION

U.S. SARA REPORTING REQUIREMENTS: Dichlorodifluoromethane is subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act, as follows:

CHEMICAL NAME	SARA 302 (40 CFR 355, Appendix A)	SARA 304 (40 CFR Table 302.4)	SARA 313 (40 CFR 372.65)
Dichlorodifluoromethane	NO	YES	YES

U.S. SARA THRESHOLD PLANNING QUANTITY: Not applicable.

U.S. CERCLA REPORTABLE QUANTITY (RQ): Dichlorodifluoromethane = 5000 lb.

CANADIAN DSL/NDL INVENTORY STATUS: Dichlorodifluoromethane is listed on the DSL Inventory.

U.S. TSCA INVENTORY STATUS: Dichlorodifluoromethane is listed on the TSCA Inventory.

OTHER U.S. FEDERAL REGULATIONS: Dichlorodifluoromethane is subject to the requirements under Title VI of the Clean Air Act Amendments of 1990: "Stratospheric Ozone Protection". Dichlorodifluoromethane is listed as a Class II ozone-depleting chemical. Containers of Dichlorodifluoromethane may be required to bear the following label:

Warning: Contains Dichlorodifluoromethane, a substance which harms public health and environment by destroying ozone in the upper atmosphere.

U.S. STATE REGULATORY INFORMATION: Dichlorodifluoromethane is covered under specific State regulations, as denoted below:

Alaska - Designated Toxic and Hazardous Substances: Dichlorodifluoromethane.

California - Permissible Exposure Limits for Chemical Contaminants:
Dichlorodifluoromethane

Florida - Substance List: Dichlorodifluoromethane

Illinois - Toxic Substance List: No.

Kansas - Section 302/313 List: No.

Massachusetts - Substance List:
Dichlorodifluoromethane.

Michigan Critical Register List: No.

Minnesota - List of Hazardous Substances: Dichlorodifluoromethane.

Missouri - Employer Information/Toxic Substance List: Dichlorodifluoro-methane.

New Jersey - Right to Know Hazardous Substance List: Dichlorodifluoromethane.

North Dakota - List of Hazardous Chemicals, Reportable Quantities: No.

Pennsylvania - Hazardous Substance List:
Dichlorodifluoromethane.

Rhode Island - Hazardous Substance List:
Dichlorodifluoromethane.

Texas - Hazardous Substance List: No.

West Virginia - Hazardous Substance List:
No.

Wisconsin - Toxic and Hazardous Substances: No.

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): Dichlorodifluoromethane is not on the California Proposition 65 lists.

LABELING:

CAUTION:

LIQUID AND GAS UNDER PRESSURE.
CAN CAUSE RAPID SUFFOCATION.
MAY CAUSE FROSTBITE.

Store and use with adequate ventilation.
Do not get liquid in eyes, on skin or clothing.
Cylinder temperature should not exceed 52°C (125°F)
Close valve after each use and when empty.
Use in accordance with the Material Safety Data Sheet.

15. REGULATORY INFORMATION (Continued)

LABELING (continued):

FIRST-AID:

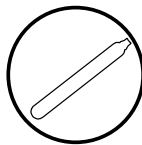
IF INHALED, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

IN CASE OF FROSTBITE, obtain immediate medical attention.

DO NOT REMOVE THIS PRODUCT LABEL.

CANADIAN WHMIS SYMBOLS:

Class A: Compressed Gases



The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof. Ideal Gases, Inc. assumes no responsibility for injury to the vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, AIRGAS, Inc. assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in his use of the material.

DEFINITIONS OF TERMS

A large number of abbreviations and acronyms appear on a MSDS. Some of these which are commonly used include the following:

CAS #: This is the Chemical Abstract Service Number which uniquely identifies each constituent. It is used for computer-related searching.

EXPOSURE LIMITS IN AIR:

ACGIH - American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits.

TLV - Threshold Limit Value - an airborne concentration of a substance which represents conditions under which it is generally believed that nearly all workers may be repeatedly exposed without adverse effect. The duration must be considered, including the 8-hour Time Weighted Average (**TWA**), the 15-minute Short Term Exposure Limit, and the instantaneous Ceiling Level (**C**). Skin absorption effects must also be considered.

OSHA - U.S. Occupational Safety and Health Administration.

PEL - Permissible Exposure Limit - This exposure value means exactly the same as a TLV, except that it is enforceable by OSHA. The OSHA Permissible Exposure Limits are based in the 1989 PELs and the June, 1993 Air Contaminants Rule (Federal Register: 58: 35338-35351 and 58: 40191). Both the current PELs and the vacated PELs are indicated. The phrase, "Vacated 1989 PEL," is placed next to the PEL which was vacated by Court Order.

IDLH - Immediately Dangerous to Life and Health - This level represents a concentration from which one can escape within 30-minutes without suffering escape-preventing or permanent injury. **The DFG - MAK** is the Republic of Germany's Maximum Exposure Level, similar to the U.S. PEL. **NIOSH** is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. Occupational Safety and Health Administration (**OSHA**). NIOSH issues exposure guidelines called **Recommended Exposure Levels (RELs)**. When no exposure guidelines are established, an entry of **NE** is made for reference.

HAZARD RATINGS:

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM: Health Hazard: **0** (minimal acute or chronic exposure hazard); **1** (slight acute or chronic exposure hazard); **2** (moderate acute or significant chronic exposure hazard); **3** (severe acute exposure hazard; onetime overexposure can result in permanent injury and may be fatal); **4** (extreme acute exposure hazard; onetime overexposure can be fatal). Flammability Hazard: **0** (minimal hazard); **1** (materials that require substantial pre-heating before burning); **2** (combustible liquid or solids; liquids with a flash point of 38-93°C [100-200°F]); **3** (Class IB and IC flammable liquids with flash points below 38°C [100°F]); **4** (Class IA flammable liquids with flash points below 23°C [73°F] and boiling points below 38°C [100°F]. Reactivity Hazard: **0** (normally stable); **1** (material that can become unstable at elevated temperatures or which can react slightly with water); **2** (materials that are unstable but do not detonate or which can react violently with water); **3** (materials that can detonate when initiated or which can react explosively with water); **4** (materials that can detonate at normal temperatures or pressures).

NATIONAL FIRE PROTECTION ASSOCIATION: Health Hazard: **0** (material that on exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials); **1** (materials that on exposure under fire conditions could cause irritation or minor residual injury); **2** (materials that on intense or continued exposure under fire conditions could cause temporary incapacitation or possible residual injury); **3** (materials that can on short exposure could cause serious temporary or residual injury); **4** (materials that under very short exposure could cause death or major residual injury). Flammability Hazard and Reactivity Hazard: Refer to definitions for "Hazardous Materials Identification System".

FLAMMABILITY LIMITS IN AIR:

Much of the information related to fire and explosion is derived from the National Fire Protection Association (**NFPA**). Flash Point - Minimum temperature at which a liquid gives off sufficient vapors to form an ignitable mixture with air. Autoignition Temperature: The minimum temperature required to initiate combustion in air with no other source of ignition. LEL - the lowest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source. UEL - the highest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source.

TOXICOLOGICAL INFORMATION:

Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. Definitions of some terms used in this section are: **LD₅₀** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC₅₀** - Lethal Concentration (gases) which kills 50% of the exposed animals; **ppm** concentration expressed in parts of material per million parts of air or water; **mg/m³** concentration expressed in weight of substance per volume of air; **mg/kg** quantity of material, by weight, administered to a test subject, based on their body weight in kg. Data from several sources are used to evaluate the cancer-causing potential of the material. The sources are: **IARC** - the International Agency for Research on Cancer; **NTP** - the National Toxicology Program, **RTECS** - the Registry of Toxic Effects of Chemical Substances, **OSHA** and **CAL/OSHA**. IARC and NTP rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Subrankings (2A, 2B, etc.) are also used. Other measures of toxicity include **TDLo**, the lowest dose to cause a symptom and **TCLo** the lowest concentration to cause a symptom; **TDo**, **LDLo**, and **LDo**, or **TC**, **TCo**, **LCLo**, and **LCo**, the lowest dose (or concentration) to cause lethal or toxic effects. **BEI** - Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV. Ecological Information: EC is the effect concentration in water.

REGULATORY INFORMATION:

This section explains the impact of various laws and regulations on the material. **EPA** is the U.S. Environmental Protection Agency. **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **DOT** and **TC** are the U.S. Department of Transportation and the Transport Canada, respectively. Superfund Amendments and Reauthorization Act (**SARA**); the Canadian Domestic/Non-Domestic Substances List (**DSL/NDL**); the U.S. Toxic Substance Control Act (**TSCA**); Marine Pollutant status according to the **DOT**; the Comprehensive Environmental Response, Compensation, and Liability Act (**CERCLA** or **Superfund**); and various state regulations.