



widespread skin contact may result in absorption of potentially harmful amounts of material.

**Swallowing.** An unlikely route of exposure. This product is a gas at normal temperature and pressure. Highly to seriously toxic. May cause severe burns of the mouth, throat, esophagus, and stomach. There may be pain in the mouth, throat, chest, and abdomen and possible swelling of the tissues in the mouth and throat. Effects may include nausea, vomiting, diarrhea, dizziness, drowsiness, faintness, weakness, thirst, circulatory collapse, and loss of consciousness.

**Eye Contact.** Vapor will cause discomfort or pain in the eye, with excess tear production and blinking, and excess redness and possibly swelling of the conjunctiva. If high concentrations of hydrogen chloride are formed, then injury to the cornea may develop. Splashes of liquid into the eye will cause pain, excess tear production and blinking, and marked excess redness and swelling of the conjunctiva. Severe corneal injury may occur, which, if not adequately treated, could permanently impair vision.

**Effects of Repeated (Chronic) Overexposure.** Prolonged or repeated exposure to hydrogen chloride vapor may discolor and erode the teeth, ulcerate the nasal mucosa, and cause the nose and gums to bleed.

**Other Effects of Overexposure.** None known.

**Medical Conditions Aggravated by Overexposure.** Inhalation may aggravate asthma and inflammatory or fibrotic pulmonary disease. Skin irritation may aggravate an existing dermatitis.

**CARCINOGENICITY:** Inorganic dichlorosilane is not listed by NTP, OSHA, and IARC.

**POTENTIAL ENVIRONMENTAL EFFECTS:** None known. For further information, see section 12, Ecological Information.

### 3. Composition/Information on Ingredients

See section 16 for important information about mixtures.

COMPONENT	CAS NUMBER	CONCENTRATION
Dichlorosilane	4109-96-0	>99%*
Hydrogen Chloride**	7647-01-0	Trace

\*The symbol > means "greater than."

\*\*Dichlorosilane reacts with moisture to form hydrochloric acid (aqueous hydrogen chloride).  
See section 3.

### 4. First Aid Measures

**INHALATION:** Immediately remove to fresh air. If not breathing, give artificial respiration.

**WARNING: Rescuer may receive chemical burns from giving mouth-to-mouth resuscitation.**

If breathing is difficult, qualified personnel may give oxygen. Get immediate medical attention, even if no symptoms are present. Call a physician.

**SKIN CONTACT:** Remove contaminated clothing and wash skin with soap and water. Wash clothing before reuse. If irritation persists or contact has been prolonged, call a physician.

**SWALLOWING:** An unlikely route of exposure. This product is a gas at normal temperature and pressure. If patient is fully conscious, give two glasses of water or milk at once. Do not induce vomiting. Get medical attention without delay.

**EYE CONTACT:** Immediately flush eyes thoroughly with water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Seek the advice of a physician, preferably an ophthalmologist, immediately.

**NOTES TO PHYSICIAN:** *Part of the effects from overexposure to dichlorosilane are due to liberation of hydrogen chloride.*

- *Dichlorosilane is highly irritant and corrosive to mucosae.*
- *Swallowed dichlorosilane may produce ulceration and possibly perforation in the upper alimentary tract. Mediastinitis or peritonitis and the complications thereof may develop.*
- *With massive overexposure to the vapor, delayed onset pulmonary edema may develop. Secondary infection may develop in the inflamed respiratory tract. Individuals having significant overexposure to the vapor should be kept under observation.*
- *Aspirated material may produce lung injury. Emesis should not be induced mechanically or pharmacologically. If it is considered necessary to evacuate the stomach contents, then this should be undertaken by means least likely to result in aspiration, e.g., in the presence of airway intubation. Caution should be taken to avoid perforation of an acutely inflamed or ulcerated area of the alimentary tract.*

Contact the Poison Control Center in your area for additional information on patient management and follow-up.

## 5. Fire Fighting Measures

**FLAMMABLE PROPERTIES:** Forms explosive mixtures with air and oxidizing agents.

**SUITABLE EXTINGUISHING MEDIA:** No known fire extinguishing methods. Coarse water spray or all-purpose type foams applied in accordance with manufacturer's recommendations for large fires.

**PRODUCTS OF COMBUSTION:** See section 10.

**PROTECTION OF FIREFIGHTERS: DANGER! Poisonous, flammable, corrosive liquid and gas under pressure.** Evacuate all personnel from danger area. Do not approach area without self-contained breathing apparatus and protective clothing. Immediately cool cylinders with water spray from maximum distance, taking care not to extinguish flames. Remove ignition sources if without risk. If flames are accidentally extinguished, explosive reignition may occur. Take appropriate measures, e.g., total evacuation. Withdraw immediately in case of rising sound from the venting safety device or any discoloration of tank due to fire. Re-approach with extreme caution. Reduce corrosive vapors with coarse water spray. Reverse flow into cylinder may cause rupture. (See section 16.) Stop flow of gas if without risk, while continuing cooling water spray. Remove all containers from area of fire if without risk. Allow fire to burn out. On-site fire brigades must comply with OSHA 29 CFR 1910.156.

**Specific Physical and Chemical Hazards.** Heat of fire can build pressure in cylinder and cause it to rupture. Dichlorosilane cylinders may be equipped with a pressure relief device. No part of cylinder should be subjected to a temperature higher than 125°F (52°C). If leaking or spilled dichlorosilane catches fire, do not extinguish flames. Poisonous, flammable, and corrosive vapors may spread from leak and could explode if reignited by sparks, flames, or

other sources of ignition including imperceptible static sparks. Explosive atmospheres may linger. Before entering area, especially confined areas, check with an appropriate device. To protect persons from cylinder fragments and toxic fumes should a rupture occur, evacuate the area if the fire cannot be brought under immediate control.

**This product has a low autoignition temperature.** Exposure to heat from a fire or from the water-dichlorosilane reaction can cause the dichlorosilane to autoignite. The acidic decomposition products formed by burning dichlorosilane from leaks may rapidly attack the metal at the leak area, especially if the metal is hot. Use proper bonding and grounding during liquid transfer as described in National Fire Protection Association document NFPA 77.

**Extremely easy to ignite vapor.** Minimum ignition energy—0.0154 millijoules (similar to carbon disulfide). Quenching distance—0.005-inch (12.7 mm, less than hydrogen, ASTM E582-76). Vapor may require special precautions beyond Group A of Article 500-2 of National Electrical Code. Vapor has very low autoignition temperature of  $111 \pm 5^\circ\text{F}$  ( $44 \pm 3^\circ\text{C}$ ) in dry air (ASTM E659-78). May ignite spontaneously in hot air or if it contacts a hot body of about this temperature or greater. Vapor burns extremely rapidly in air. Deflagrates significantly faster than hydrogen. Explosibility indices are  $P_{\text{max}} = 149 \text{ psia}$  (1027 kPa) and  $KG = 1990 \text{ bar-m/s}$  in a 5.28-gal (20-liter) vessel. It may not be possible to successfully vent a deflagration. Dichlorosilane may detonate in confinement.

**Protective Equipment and Precautions for Firefighters.** Firefighters should wear self-contained breathing apparatus and full fire-fighting turnout gear.

## 6. Accidental Release Measures

### STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:

**DANGER! Poisonous, flammable, corrosive liquid and gas under pressure.**

**Personal Precautions.** Immediately evacuate all personnel from danger area. Do not approach area without self-contained breathing apparatus and protective clothing. Gas forms explosive mixtures with air. (See section 5). Before entering area, especially a confined area, check atmosphere with an appropriate device. Remove all sources of ignition if without risk. A dichlorosilane fire will usually result if a spill contacts a small amount of water. Reduce vapors with coarse water spray. Reverse flow into cylinder may cause rupture. (See section 16.) Shut off flow if without risk. Ventilate area or move cylinder to well-ventilated area. Prevent runoff from contaminating surrounding environment. Poisonous, flammable vapors may spread from spill. Do not turn on any ignition source until the area is determined to be free of fire or explosion hazard.

**Environmental Precautions.** Prevent waste from contaminating the surrounding environment. Keep personnel away. 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 supplier for assistance.

## 7. Handling and Storage

**PRECAUTIONS TO BE TAKEN IN HANDLING: Store and use in a dry environment with adequate ventilation at all times.** Keep away from oxidizing agents and from other flammables. Close valve after each use; keep closed even when empty. **Aspiration may cause lung damage.** Do not breathe gas. **Causes eye and skin burns. Harmful if absorbed through skin.** Do not get vapors or liquid in eyes, on skin or clothing. Do not induce vomiting. Have safety showers and eyewash fountains immediately available. Use piping and

equipment adequately designed to withstand pressures to be encountered. **May form explosive mixtures with air. Vapor may cause flash fire.** Keep away from heat, sparks, or open flame. Ground all equipment. Use only spark-proof tools and explosion-proof equipment. Static ignition hazard can result from handling and use. Electrical equipment must be non-sparking or explosion-proof.

**Protect cylinders from damage.** Use a suitable hand truck to move cylinders; do not drag, roll, slide, or drop. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. Never insert an object (e.g., wrench, screwdriver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. **Open valve slowly.** If valve is hard to open, discontinue use and contact your supplier. For other precautions in using dichlorosilane, see section 16.

**PRECAUTIONS TO BE TAKEN IN STORAGE:** Store and use with adequate ventilation. Separate dichlorosilane cylinders from oxygen and other oxidizers by at least 20 ft (6.1 m), or use a barricade of noncombustible material. This barricade should be at least 5 ft (1.53 m) high and have a fire resistance rating of at least ½ hour. Firmly secure cylinders upright to keep them from falling or being knocked over. Screw valve protection cap firmly in place by hand. Store only where temperature will not exceed 125°F (52°C). Store full and empty cylinders separately. Use a first-in, first-out inventory system to prevent storing full cylinders for long periods. Post "No Smoking or Open Flames" signs in storage and use areas. There must be no sources of ignition. All electrical equipment in storage areas must be explosion-proof. Storage areas must meet national electric codes for Class 1 hazardous areas.

**RECOMMENDED PUBLICATIONS:** For further information on storage, handling, and use, see Praxair publication P-14-153, *Guidelines for Handling Gas Cylinders and Containers*. Obtain from your local supplier.

## 8. Exposure Controls/Personal Protection

COMPONENT	OSHA PEL	ACGIH TLV-TWA (2007)
Dichlorosilane	N.E.*	N.E.*
Hydrogen Chloride	5 ppm ceiling**	2 ppm ceiling**

\* N.E.—Not Established. Praxair recommends compliance with the OSHA and ACGIH (2006) limits of 2 ppm (ceiling) for hydrogen chloride (HCl), formed by the hydrolysis of dichlorosilane.

\*\* Ceiling values are not Time-Weighted-Average (TWA).

TLV-TWAs should be used as a guide in the control of health hazards and not as fine lines between safe and dangerous concentrations.

IDLH = Not available, dichlorosilane; 50 ppm, hydrogen chloride.

### ENGINEERING CONTROLS:

**Local Exhaust.** Use a corrosion-resistant local exhaust ventilation system with sufficient air flow velocity to maintain concentration below all applicable exposure limits in the worker's breathing zone.

**Mechanical (General).** Not recommended as a primary ventilation system to control worker's exposure.

**Special.** Use only in a closed system.

**Other.** See Special.

**PERSONAL PROTECTIVE EQUIPMENT:**

**Skin Protection.** Neoprene. Metatarsal shoes for cylinder handling and protective clothing where needed. Select per OSHA 29 CFR 1910.132 and 1910.133. Regardless of protective equipment, never touch live electrical parts.

**Eye/Face Protection.** Wear safety glasses when handling cylinders. Select per OSHA 29 CFR 1910.133.

**Respiratory Protection.** Use an air-supplied respirator or a full-face, positive-pressure, self-contained breathing apparatus. Respiratory protection must conform to OSHA rules as specified in 29 CFR 1910.134. Select per OSHA 29 CFR 1910.134 and ANSI Z88.2.

<b>9. Physical and Chemical Properties</b>
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<b>APPEARANCE:</b>	Colorless gas
<b>ODOR:</b>	Hydrochloric acid—irritating choking
<b>ODOR THRESHOLD:</b>	Not available.
<b>PHYSICAL STATE:</b>	Gas at normal temperature and pressure
<b>pH:</b>	Not applicable.
<b>MELTING POINT</b> at 1 atm:	-187.6°F (-122.0°C)
<b>BOILING POINT</b> at 1 atm:	46.94°F (8.3°C)
<b>FLASH POINT</b> (test method):	-62°F (-52.2°C) TCC ASTM D56
<b>EVAPORATION RATE</b> (Butyl Acetate = 1):	82 (estimated)
<b>FLAMMABILITY:</b>	Flammable
<b>FLAMMABLE LIMITS IN AIR</b> , % by volume:	<b>LOWER:</b> 4.6-4.8% <b>UPPER:</b> 94.0-98.0%
<b>VAPOR PRESSURE</b> at 68°F (20°C):	24.25 psia (167.18 kPa, abs)
<b>VAPOR DENSITY</b> at 70°F (21.1°C) and 1 atm:	0.2612 lb/ft <sup>3</sup> (4.183 kg/m <sup>3</sup> )
<b>SPECIFIC GRAVITY</b> (H <sub>2</sub> O = 1) at 19.4°F (-7°C):	1.22
<b>SPECIFIC GRAVITY</b> (Air = 1) at 70°F (21.1°C) and 1 atm:	3.488
<b>SOLUBILITY IN WATER</b> 68°F (20°C):	Reacts
<b>PARTITION COEFFICIENT: n-octanol/water:</b>	Not available.
<b>AUTOIGNITION TEMPERATURE:</b>	Vapor has a very low autoignition temperature of approximately 111 ± 5°F (44 ± 3°C) in dry air.
<b>DECOMPOSITION TEMPERATURE:</b>	None
<b>PERCENT VOLATILES BY VOLUME:</b>	100
<b>MOLECULAR WEIGHT:</b>	101.07
<b>MOLECULAR FORMULA:</b>	Cl <sub>2</sub> H <sub>2</sub> Si

## 10. Stability and Reactivity

**CHEMICAL STABILITY:**  Unstable  Stable

This material is stable as shipped and stored under normal conditions, i.e., 70°F (21.1°C) so long as exposure to air, water, moisture, and other incompatible materials is avoided.

**CONDITIONS TO AVOID:** Contact with air, water, or alkali.

**INCOMPATIBLE MATERIALS:** At room temperatures, this product may explode on contact with nitrates; other oxidizing agents may cause similar behavior. It reacts violently with water. It reacts rapidly (exothermically) with alcohols, primary and secondary amines, ammonia, and other compounds containing active hydrogen atoms. It will react violently with the water in aqueous acid solutions. When it reacts with moisture in the air, it produces dense white clouds of silica and large volumes of hydrogen chloride. Hydrogen, which can pose fire and explosion hazards, may also be evolved. The solid hydrolysis products are also reported to be flammable.

Dichlorosilane may redistribute under the influence of heat or catalysts, such as amines, rust, or aluminum chloride, to form mixtures of silane, monochlorosilane, trichlorosilane, and silicon tetrachloride. These mixtures may be pyrophoric (may ignite spontaneously when exposed to air or oxygen).

**HAZARDOUS DECOMPOSITION PRODUCTS:** Burning can produce chlorine, hydrogen chloride, hydrogen, and oxides of silicon. Acute overexposure to the products of combustion may irritate the respiratory tract. Fires resulting from chlorosilane leaks in steel equipment present a special hazard. The acidic decomposition products may rapidly attack the steel at the leak area, especially if the steel is hot.

**POSSIBILITY OF HAZARDOUS REACTIONS:**  May Occur  Will Not Occur

Fire, explosion, possible spontaneous ignition. Hazardous polymerization may occur.

## 11. Toxicological Information

**ACUTE DOSE EFFECTS:** LC<sub>50</sub>, 1 hr, rat = 314 ppm

**STUDY RESULTS:** In a short-term (9-day) repeated-exposure study with vapor from dichlorosilane, evidence of lung injury was present down to a nominal vapor concentration of 2.7 ppm. (The equivalent of HCl concentration was 8.0 ppm.) These findings indicate that lung injury is not solely due to HCl formed from dichlorosilane.

## 12. Ecological Information

**ECOTOXICITY:** No known effects.

**OTHER ADVERSE EFFECTS:** Dichlorosilane does not contain any Class I or Class II ozone-depleting chemicals.

## 13. Disposal Considerations

**WASTE DISPOSAL METHOD:** Do not attempt to dispose of residual or unused quantities. Return cylinder to supplier.

**Emergency Disposal.**

**CAUTION: Any disposal must be conducted in accordance with federal, state, and local regulations.**

**EMERGENCY DISPOSAL:** Dichlorosilane can be disposed of by first reacting it with water, then neutralizing the acid (HCl) that is formed by the reaction. This reaction proceeds rapidly and liberates heat, hydrogen, and hydrogen chloride. Wear suitable protective equipment (section 8), and observe all other precautions set forth in this MSDS. Use plenty of water to absorb the heat and hydrogen chloride. The dichlorosilane should be discharged below the surface of the water and bubbled into water slowly enough to avoid discharge of vapors to the atmosphere. For more effective scrubbing, the water could contain some soda ash or caustic soda. After neutralization and dilution, the waste solution can be discharged to a biological wastewater treatment system.

#### 14. Transport Information

**DOT/IMO SHIPPING NAME:** Dichlorosilane

HAZARD CLASS:	PACKING GROUP/Zone:	IDENTIFICATION NUMBER:	PRODUCT RQ:
2.3	NA*/B	UN2189	None
<b>SHIPPING LABEL(s):</b> POISON GAS, FLAMMABLE GAS, CORROSIVE**			
<b>PLACARD (when required):</b> POISON GAS, FLAMMABLE GAS, CORROSIVE**			

\*NA = None assigned.

\*\*The words in the POISON GAS diamond are INHALATION HAZARD.

**SPECIAL SHIPPING INFORMATION:** Cylinders should be transported in a secure position, in a well-ventilated vehicle. Cylinders transported in an enclosed, nonventilated compartment of a vehicle can present serious safety hazards.

**Additional Marking Requirement:** INHALATION HAZARD

Shipment of compressed gas cylinders that have been filled without the owner's consent is a violation of federal law [49 CFR 173.301(b)].

**MARINE POLLUTANTS:** Dichlorosilane is not listed as a marine pollutant by DOT.

#### 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 (EHS) (40 CFR Part 355):

**TPQ:** None

**EHS RQ (40 CFR 355):** None

**SECTIONS 311/312:** Require submission of MSDSs and reporting of chemical inventories with identification of EPA hazard categories. The hazard categories for this product are as follows:

**IMMEDIATE:** Yes

**DELAYED:** Yes

**PRESSURE:** Yes

**REACTIVITY:** Yes

**FIRE:** Yes

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

Dichlorosilane is not subject to 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.

Dichlorosilane is listed as a regulated substance in quantities of 10,000 lb (4536 kg) or greater.

**TSCA: TOXIC SUBSTANCES CONTROL ACT:** Dichlorosilane is listed on the TSCA inventory.

**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.

Dichlorosilane is listed in Appendix A as a highly hazardous chemical in quantities of 2500 lb (1134 kg) or greater.

#### **STATE REGULATIONS:**

**CALIFORNIA:** Dichlorosilane is not listed by California under the SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (Proposition 65).

**PENNSYLVANIA:** Dichlorosilane is subject to the PENNSYLVANIA WORKER AND COMMUNITY RIGHT-TO-KNOW ACT (35 P.S. Sections 7301-7320).

### **16. Other Information**

Be sure to read and understand all labels and instructions supplied with all containers of this product.

**OTHER HAZARDOUS CONDITIONS OF HANDLING, STORAGE, AND USE:** *Poisonous, flammable, corrosive liquid and gas under pressure.* Use piping and equipment adequately designed to withstand pressures to be encountered. Use only in a closed system constructed of corrosion-resistant materials. *Prevent reverse flow.* Reverse flow into cylinder may cause rupture. Use a check valve or other protective device in any line or piping from the cylinder. *Never work on a pressurized system.* If there is a leak, close the cylinder valve. Blow the system down in an environmentally safe manner in compliance with all federal, state, and local laws; then repair the leak. *Follow safe practices when returning cylinder to supplier,* be sure valve is closed; then install valve outlet cap or plug, leak tight. *Never place a compressed gas cylinder where it may become part of an electrical circuit.*

**WARNING:** Hot organic chemical vapors or mists are susceptible to sudden spontaneous combustion when mixed with air. Ignition may occur at temperatures below those published in the literature as "autoignition" or "ignition" temperatures. Ignition temperatures decrease with increasing vapor volume and vapor/air contact time, and are influenced by pressure changes.

Ignition may occur at typical elevated-temperature process conditions, especially in processes operating under vacuum if subjected to sudden ingress of air or outside process equipment operating under elevated pressure if sudden escape of vapors or mists to the atmosphere occurs.

Any proposed use of this product in elevated-temperature processes should be thoroughly evaluated to ensure that safe operating conditions are established and maintained.

**NOTE:** Prior to using any plastics, confirm their compatibility with dichlorosilane.

**Mixtures.** When you mix two or more gases or liquefied gases, you can create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an industrial hygienist or other trained person when you evaluate the end product. Remember, gases and liquids have properties that can cause serious injury or death.

**RECOMMENDED EQUIPMENT:** In semiconductor process gas and other suitable applications, Praxair recommends the use of engineering controls such as gas cabinet enclosures, automatic gas panels (used to purge systems on cylinder changeout), excess-flow valves throughout the gas distribution system, double containment for the distribution system, and continuous gas monitors.

#### HAZARD RATING SYSTEMS:

##### NFPA RATINGS:

HEALTH = 4  
 FLAMMABILITY = 4  
 INSTABILITY = 2  
 SPECIAL = ~~W~~

##### HMIS RATINGS:

HEALTH = 3  
 FLAMMABILITY = 4  
 PHYSICAL HAZARD = 3

#### STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:

**THREADED:** CGA-678 connection is standard.  
**PIN-INDEXED YOKE:** Not applicable.  
**ULTRA-HIGH-INTEGRITY CONNECTION:** CGA-636

Use the proper CGA connections. **DO NOT USE ADAPTERS.** Additional limited-standard connections may apply. See CGA pamphlet V-1 listed below.

Ask your supplier about free Praxair safety literature as referred to in this MSDS and on the label for this product. Further information can be found in the following materials published by the Compressed Gas Association, Inc. (CGA), 4221 Walney Road, 5<sup>th</sup> Floor, Chantilly, VA 20151-2923, telephone (703) 788-2700, <http://www.cganet.com/Publication.asp>.

P-1 *Safe Handling of Compressed Gases in Containers*  
 V-1 *Compressed Gas Cylinder Valve Inlet and Outlet Connections*  
 — *Handbook of Compressed Gases, Fourth Edition*

Praxair asks users of this product to study this MSDS and become aware of product hazards and safety information. To promote safe use of this product, a user should (1) notify employees, agents, and contractors of the information in this MSDS and of any other known product hazards and safety information, (2) furnish this information to each purchaser of the product, and (3) ask each purchaser to notify its employees and customers of the product hazards and safety information.

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The opinions expressed herein are those of qualified experts within Praxair, Inc. We believe that the information contained herein is current as of the date of this Material Safety Data Sheet. Since the use of this information and the conditions of use of the product are not within the control of Praxair, Inc., it is the user's obligation to determine the conditions of safe use of the product.

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