

Safety Data Sheet P-4580

This SDS conforms to U.S. Code of Federal Regulations 29 CFR 1910.1200, Hazard Communication.
Issue date: 01/01/1979 Revision date: 02/04/2021 Supersedes: 08/16/2018 Version: 1.0

SECTION: 1. Product and company identification

1.1. Product identifier

Product form : Substance
Substance name : Chlorine
CAS-No. : 7782-50-5
Formula : Cl₂

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

Use of the substance/mixture : Industrial use; Use as directed.

1.3. Details of the supplier of the safety data sheet

Linde Inc.
10 Riverview Drive
Danbury, CT 06810-6268 - USA

1.4. Emergency telephone number

Emergency number : Onsite Emergency: 1-800-645-4633

CHEMTREC, 24hr/day 7days/week
— Within USA: 1-800-424-9300, Outside USA: 001-703-527-3887
(collect calls accepted, Contract 17729)

SECTION 2: Hazard identification

2.1. Classification of the substance or mixture

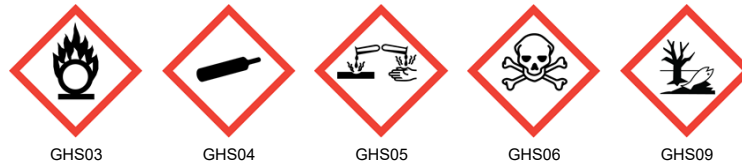
GHS US classification

Ox. Gas 1	H270
Press. Gas (Liq.)	H280
Acute Tox. 2 (Inhalation: gas)	H330
Skin Corr. 1	H314
Eye Dam. 1	H318
STOT SE 3	H335
Aquatic Acute 1	H400

2.2. Label elements

GHS US labeling

Hazard pictograms (GHS US) :



Signal word (GHS US) :

Danger

Hazard statements (GHS US) :

H270 - MAY CAUSE OR INTENSIFY FIRE; OXIDIZER
H280 - CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED
H314 - CAUSES SEVERE SKIN BURNS AND EYE DAMAGE
H330 - FATAL IF INHALED
H400 - VERY TOXIC TO AQUATIC LIFE
CGA-HG01 - MAY CAUSE FROSTBITE.
CGA-HG22 - CORROSIVE TO THE RESPIRATORY TRACT

Precautionary statements (GHS US) :

P202 - Do not handle until all safety precautions have been read and understood.
P220 - Keep/Store away from clothing and other combustible materials
P244 - Keep reduction valves/valves and fittings free from oil and grease.
P260 - Do not breathe gas
P262 - Do not get in eyes, on skin, or on clothing.

EN (English US)

SDS ID: P-4580

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P264 - Wash hands thoroughly after handling
P271+P403 - Use and store only outdoors or in a well-ventilated place.
P273 - Avoid release to the environment.
P280+P284 - Wear protective gloves, protective clothing, eye protection, respiratory protection, and/or face protection.
P307+P310 - IF EXPOSED: Immediately call a DOCTOR or poison center
P303+P361+P353 - IF ON SKIN OR (HAIR): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P336 - Thaw frosted parts with lukewarm water. Do not rub affected area.
P363 - Wash contaminated clothing before reuse.
P304+P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P310 - Immediately call a poison center or doctor/physician.
P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Contact an ophthalmologist immediately.
P370+P376 - IN CASE OF FIRE: Stop leak if safe to do so
P403 - Use and store only outdoors or in a well-ventilated place.
P405 - Store locked up.
P501 - Dispose of contents/container Dispose in a safe manner in accordance with local/national regulations
CGA-PG05 - Use a back flow preventive device in the piping.
CGA-PG20+CGA-PG10 - Use only with equipment of compatible materials of construction and rated for cylinder pressure.
CGA-PG22 - Use only with equipment cleaned for oxygen service.
CGA-PG12 - Do not open valve until connected to equipment prepared for use.
CGA-PG21 - Open valve slowly.
CGA-PG06 - Close valve after each use and when empty.
CGA-PG18 - When returning cylinder, install leak tight valve outlet cap or plug.
CGA-PG02 - Protect from sunlight when ambient temperature exceeds 52°C (125°F).

2.3. Other hazards

Other hazards which do not result in classification : None.

2.4. Unknown acute toxicity (GHS US)

No data available

SECTION 3: Composition/Information on ingredients

3.1. Substances

Name	Product identifier	%
Chlorine (Main constituent)	(CAS-No.) 7782-50-5	100

3.2. Mixtures

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures after inhalation : Remove to fresh air and keep at rest in a position comfortable for breathing. If not breathing, give artificial respiration. If breathing is difficult, trained personnel should give oxygen. Call a physician. . WARNING: To avoid possible chemical burns, the rescuer should avoid breathing any exhaled air from the victim.

First-aid measures after skin contact : Avoid breathing vapors. In case of contact, immediately flush affected areas with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician. Wash clothing before reuse. Discard contaminated shoes.

First-aid measures after 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. Contact an ophthalmologist immediately.

First-aid measures after ingestion : Ingestion is not considered a potential route of exposure.



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4.2. Most important symptoms and effects, both acute and delayed

Symptoms/effects after inhalation : Overexposure to concentrations moderately above the TLV of 1 ppm irritates the eyes and respiratory tract. Very brief exposure to a concentration of 1000 ppm may be fatal. Acts as an asphyxiant at high concentrations. Inhalation of high concentrations (e.g. greater than 15 ppm) causes choking, coughing, burning of the throat, and severe irritation of the upper respiratory tract; additionally, pulmonary edema, bronchitis, and pneumonitis may result.

4.3. Indication of any immediate medical attention and special treatment needed

Obtain medical assistance.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : Use extinguishing media appropriate for surrounding fire.

5.2. Special hazards arising from the substance or mixture

Fire hazard : Oxidizer. May accelerate the burning of other combustible materials.
Reactivity : No reactivity hazard other than the effects described in sub-sections below.

5.3. Advice for firefighters

Firefighting instructions : Evacuate all personnel from the danger area. Use self-contained breathing apparatus (SCBA) and protective clothing. Immediately cool containers with water from maximum distance. Stop flow of gas if safe to do so, while continuing cooling water spray. Remove ignition sources if safe to do so. Remove containers from area of fire if safe to do so. On-site fire brigades must comply with OSHA 29 CFR 1910.156 and applicable standards under 29 CFR 1910 Subpart L—Fire Protection.

Protection during firefighting : **DANGER! Toxic, corrosive, high-pressure gas..**

Special protective equipment for fire fighters : Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters.

Specific methods : Use fire control measures appropriate for the surrounding fire. Exposure to fire and heat radiation may cause gas containers to rupture. Cool endangered containers with water spray jet from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems.

Stop flow of product if safe to do so.

Use water spray or fog to knock down fire fumes if possible.

Other information : Containers are equipped with a pressure relief device. (Exceptions may exist where authorized by DOT.).

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures : **Danger: Oxidizing gases. Corrosive.** Evacuate personnel to a safe area. Wear a self-contained breathing apparatus and appropriate personal protective equipment (PPE). (gas tight, chemical-protective) Approach suspected leak area with caution. Remove all sources of ignition. Toxic, corrosive vapor can spread from spill. Contact with flammable materials may cause fire or explosion. Ventilate area or move container to a well-ventilated area. Before entering the area, especially a confined area, check the atmosphere with an appropriate device. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.

6.1.1. For non-emergency personnel

No additional information available

6.1.2. For emergency responders

No additional information available

6.2. Environmental precautions

Prevent waste from contaminating the surrounding environment. Prevent soil and water pollution. Dispose of contents/container in accordance with local/regional/national/international regulations. Contact supplier for any special requirements.



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6.3. Methods and material for containment and cleaning up

No additional information available

6.4. Reference to other sections

See also sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling

: Do not breathe gas/vapor. Avoid all contact with skin, eyes, or clothing. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.

Wear leather safety gloves and safety shoes when handling cylinders. Protect cylinders from physical damage; do not drag, roll, slide or drop. While moving cylinder, always keep in place removable valve cover. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. 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. Slowly open the valve. If the valve is hard to open, discontinue use and contact your supplier. Close the container valve after each use; keep closed even when empty. Never apply flame or localized heat directly to any part of the container. High temperatures may damage the container and could cause the pressure relief device to fail prematurely, venting the container contents. For other precautions in using this product, see section 16.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions

: Avoid oil, grease and all other combustible materials.

Store only where temperature will not exceed 125°F (52°C). Post "No Smoking/No Open Flames" signs in storage and use areas. There must be no sources of ignition. Separate packages and protect against potential fire and/or explosion damage following appropriate codes and requirements (e.g. NFPA 30, NFPA 55, NFPA 70, and/or NFPA 221 in the U.S.) or according to requirements determined by the Authority Having Jurisdiction (AHJ). Always secure containers upright to keep them from falling or being knocked over. Install valve protection cap, if provided, firmly in place by hand when the container is not in use. Store full and empty containers separately. Use a first-in, first-out inventory system to prevent storing full containers for long periods. For other precautions in using this product, see section 16.

OTHER PRECAUTIONS FOR HANDLING, STORAGE, AND USE: When handling product under pressure, use piping and equipment adequately designed to withstand the pressures to be encountered. Never work on a pressurized system. Use a back flow preventive device in the piping. Gases can cause rapid suffocation because of oxygen deficiency; store and use with adequate ventilation. If a leak occurs, close the container valve and blow down the system in a safe and environmentally correct manner in compliance with all international, federal/national, state/provincial, and local laws; then repair the leak. Never place a container where it may become part of an electrical circuit.

7.3. Specific end use(s)

None.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Chlorine (7782-50-5)		
ACGIH	ACGIH OEL TWA [ppm]	0.1 ppm
ACGIH	ACGIH OEL STEL [ppm]	0.4 ppm
USA OSHA	OSHA PEL (Ceiling)	3 mg/m ³
USA OSHA	OSHA PEL C [ppm]	1 ppm
USA IDLH	IDLH [ppm]	10 ppm



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8.2. Exposure controls

Appropriate engineering controls	: Use only in a closed system. A corrosion-resistant, forced-draft fume hood is preferred. LOCAL EXHAUST: A corrosion-resistant system is acceptable.
Eye protection	: Wear safety glasses with side shields. Wear goggles and a face shield when transfilling or breaking transfer connections. Provide readily accessible eye wash stations and safety showers. Wear safety glasses with side shields or goggles when transfilling or breaking transfer connections.
Skin and body protection	: Wear metatarsal shoes and work gloves for cylinder handling, and protective clothing where needed. Wear appropriate chemical gloves during cylinder changeout or wherever contact with product is possible. Select per OSHA 29 CFR 1910.132, 1910.136, and 1910.138.
Respiratory protection	: When workplace conditions warrant respirator use, follow a respiratory protection program that meets OSHA 29 CFR 1910.134, ANSI Z88.2, or MSHA 30 CFR 72.710 (where applicable). Use an air-supplied or air-purifying cartridge if the action level is exceeded. Ensure that the respirator has the appropriate protection factor for the exposure level. If cartridge type respirators are used, the cartridge must be appropriate for the chemical exposure. For emergencies or instances with unknown exposure levels, use a self-contained breathing apparatus (SCBA).
Thermal hazard protection	: Wear cold insulating gloves when transfilling or breaking transfer connections.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	: Gas
Appearance	: Greenish-yellow gas. Amber liquid.
Molecular mass	: 71 g/mol
Color	: Greenish gas.
Odor	: Pungent.
Odor threshold	: Odor threshold is subjective and inadequate to warn for overexposure. 0.23 mg/m ³ (Dixon and Ikels)
pH	: Not applicable.
Relative evaporation rate (butyl acetate=1)	: No data available
Relative evaporation rate (ether=1)	: Not applicable.
Melting point	: -101 °C (-149.85°F)
Freezing point	: No data available
Boiling point	: -34.05 °C (-29.25°F)
Flash point	: Not applicable.
Critical temperature	: 144 °C
Auto-ignition temperature	: Not applicable.
Decomposition temperature	: No data available
Flammability (solid, gas)	: No data available
Vapor pressure	: 6.9 bar (100 psia) (@20°C [68°F])
Critical pressure	: 77.11 bar (1118.4 psia)
Relative vapor density at 20 °C	: No data available
Relative density	: 1.6
Density	: 2.7 kg/m ³ (at 50 °C)
Relative gas density	: 2.5
Solubility	: Water: 8620 mg/l
Partition coefficient n-octanol/water (Log Pow)	: Not applicable.
Partition coefficient n-octanol/water (Log Kow)	: Not applicable.
Viscosity, kinematic	: Not applicable.
Viscosity, dynamic	: Not applicable.
Explosive properties	: Not applicable.



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Oxidizing properties : Oxidizer.
Explosion limits : Non flammable.

9.2. Other information

Gas group : Press. Gas (Liq.)
Additional information : Gas/vapor heavier than air. May accumulate in confined spaces, particularly at or below ground level.

SECTION 10: Stability and reactivity

10.1. Reactivity

No reactivity hazard other than the effects described in sub-sections below.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

May occur.

10.4. Conditions to avoid

Air contact. High temperature. Moisture. Incompatible materials.

10.5. Incompatible materials

Chlorine reacts with most materials, especially flammable materials, other reducing agents, and nearly all metals. At temperatures below 250°F (121°C) certain common metals (e.g. iron, copper, steel, lead, nickel) resist reaction with dry chlorine, but others (e.g. aluminum, arsenic, gold, mercury, tin, titanium) react. Moist chlorine is highly corrosive except to glass, stoneware, porcelain, and certain alloys and only at low pressure. Titanium ignites spontaneously on contact with dry chlorine. Carbon steel ignites in chlorine at temperatures near 483°F (251°C).

10.6. Hazardous decomposition products

Toxic fumes. Chlorides.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Not classified

Chlorine (f)7782-50-5	
LD50 oral rat	6800 mg/kg
LC50 Inhalation - Rat [ppm]	146.5 ppm/4h
ATE US (oral)	6800 mg/kg body weight
ATE US (gases)	146.5 ppmV/4h

Skin corrosion/irritation : Causes severe skin burns.
pH: Not applicable.
Serious eye damage/irritation : CAUSES SERIOUS EYE DAMAGE.
pH: Not applicable.
Respiratory or skin sensitization : Not classified
Germ cell mutagenicity : Not classified
Carcinogenicity : Not classified
Reproductive toxicity : Not classified
STOT-single exposure : MAY CAUSE RESPIRATORY IRRITATION.
STOT-repeated exposure : Not classified
Aspiration hazard : Not classified

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Symptoms/effects after inhalation : Overexposure to concentrations moderately above the TLV of 1 ppm irritates the eyes and respiratory tract. Very brief exposure to a concentration of 1000 ppm may be fatal. Acts as an asphyxiant at high concentrations. Inhalation of high concentrations (e.g, greater than 15 ppm) causes choking, coughing, burning of the throat, and severe irritation of the upper respiratory tract; additionally, pulmonary edema, bronchitis, and pneumonitis may result.

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general : VERY TOXIC TO AQUATIC LIFE.

Chlorine (7782-50-5)	
LC50 - Fish [1]	0.44 mg/l (Exposure time: 96 h - Species: Lepomis macrochirus [flow-through])
EC50 - Crustacea [1]	0.017 mg/l (Exposure time: 48 h - Species: Daphnia magna)
LC50 - Fish [2]	0.014 mg/l (Exposure time: 96 h - Species: Oncorhynchus mykiss [flow-through])

12.2. Persistence and degradability

Chlorine (7782-50-5)	
Persistence and degradability	Not applicable for inorganic gases.

12.3. Bioaccumulative potential

Chlorine (7782-50-5)	
BCF - Fish [1]	(no bioaccumulation expected)
Partition coefficient n-octanol/water (Log Pow)	Not applicable.
Partition coefficient n-octanol/water (Log Kow)	Not applicable.
Bioaccumulative potential	No data available.

12.4. Mobility in soil

Chlorine (7782-50-5)	
Mobility in soil	No data available.
Ecology - soil	Because of its high volatility, the product is unlikely to cause ground or water pollution.

12.5. Other adverse effects

Other adverse effects : May cause pH changes in aqueous ecological systems.
 Effect on ozone layer : None.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Product/Packaging disposal recommendations : Do not attempt to dispose of residual or unused quantities. Return container to supplier.

SECTION 14: Transport information

In accordance with DOT

Transport document description (DOT) : UN1017 Chlorine, 2.3
 UN-No.(DOT) : UN1017
 Proper Shipping Name (DOT) : Chlorine
 Class (DOT) : 2.3 - Class 2.3 - Poisonous gas 49 CFR 173.115
 Hazard labels (DOT) : Poison Gas
 2.3 - Poison gas



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- DOT Special Provisions (49 CFR 172.102) : 2 - This material is poisonous by inhalation (see 171.8 of this subchapter) in Hazard Zone B (see 173.116(a) or 173.133(a) of this subchapter), and must be described as an inhalation hazard under the provisions of this subchapter.
B9 - Bottom outlets are not authorized.
B14 - Each bulk packaging, except a tank car or a multi-unit-tank car tank, must be insulated with an insulating material so that the overall thermal conductance at 15.5 C (60 F) is no more than 1.5333 kilojoules per hour per square meter per degree Celsius (0.075 Btu per hour per square foot per degree Fahrenheit) temperature differential. Insulating materials must not promote corrosion to steel when wet.
N86 - UN pressure receptacles made of aluminum alloy are not authorized.
T50 - When portable tank instruction T50 is referenced in Column (7) of the 172.101 Table, the applicable liquefied compressed gases are authorized to be transported in portable tanks in accordance with the requirements of 173.313 of this subchapter.
TP19 - The calculated wall thickness must be increased by 3 mm at the time of construction. Wall thickness must be verified ultrasonically at intervals midway between periodic hydraulic tests (every 2.5 years). The portable tank must not be used if the wall thickness is less than that prescribed by the applicable T code in Column (7) of the Table for this material.
- Marine pollutant : P



Additional information

- Emergency Response Guide (ERG) Number : 124;173
- Other information : No supplementary information available.
- Special transport precautions : Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product containers:
- Ensure there is adequate ventilation. - Ensure that containers are firmly secured. - Ensure cylinder valve is closed and not leaking. - Ensure valve outlet cap nut or plug (where provided) is correctly fitted. - Ensure valve protection device (where provided) is correctly fitted.

Transport by sea

- UN-No. (IMDG) : 1017
- Proper Shipping Name (IMDG) : CHLORINE
- Class (IMDG) : 2 - Gases
- Division (IMDG) : 2.3 - Toxic gases
- MFAG-No : 124

Air transport

- UN-No. (IATA) : 1017
- Proper Shipping Name (IATA) : Chlorine
- Class (IATA) : 2
- Civil Aeronautics Law : Gases under pressure/Gases toxic under pressure

SECTION 15: Regulatory information

15.1. US Federal regulations

Chlorine (7782-50-5)

Listed on the United States TSCA (Toxic Substances Control Act) inventory

Listed on the United States SARA Section 302

Subject to reporting requirements of United States SARA Section 313

CERCLA RQ	10 lb
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Chlorine (7782-50-5)	
SARA Section 302 Threshold Planning Quantity (TPQ)	100 lb
SARA Section 313 - Emission Reporting	1 %

All components of this product are listed on the Toxic Substances Control Act (TSCA) inventory.

15.2. International regulations

CANADA

Chlorine (7782-50-5)	
Listed on the Canadian DSL (Domestic Substances List)	

EU-Regulations

Chlorine (7782-50-5)	
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)	

15.2.2. National regulations

Chlorine (7782-50-5)	
Listed on the AICS (Australian Inventory of Chemical Substances)	
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)	
Listed on KECL/KECI (Korean Existing Chemicals Inventory)	
Listed on NZIoC (New Zealand Inventory of Chemicals)	
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)	
Japanese Poisonous and Deleterious Substances Control Law	
Listed on the Canadian IDL (Ingredient Disclosure List)	
Listed on INSQ (Mexican National Inventory of Chemical Substances)	
Listed on EPA Hazardous Air Pollutant (HAPS)	
Listed on the TCSI (Taiwan Chemical Substance Inventory)	

15.3. US State regulations

Chlorine(7782-50-5)	
U.S. - California - Proposition 65 - Carcinogens List	No
U.S. - California - Proposition 65 - Developmental Toxicity	No
U.S. - California - Proposition 65 - Reproductive Toxicity - Female	No
U.S. - California - Proposition 65 - Reproductive Toxicity - Male	No
State or local regulations	U.S. - Massachusetts - Right To Know List U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List U.S. - Pennsylvania - RTK (Right to Know) List



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SECTION 16: Other information

Other information

: When you mix two or more chemicals, 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. Before using any plastics, confirm their compatibility with this product.

Linde asks users of this product to study this SDS and become aware of the 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 SDS 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.

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

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NFPA health hazard

: 4 - Materials that, under emergency conditions, can be lethal.

NFPA fire hazard

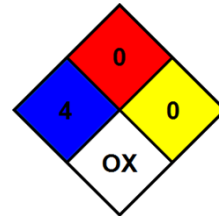
: 0 - Materials that will not burn under typical fire conditions, including intrinsically noncombustible materials such as concrete, stone, and sand.

NFPA instability

: 0 - Material that in themselves are normally stable, even under fire conditions.

NFPA specific hazard

: OX - Materials that posses oxidizing properties.



SDS US GHS DUAL BRANDED LINDE->PRAXAIR

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.