



# DEUTERIUM CHLORIDE

## Material Safety Data Sheet

### 1. PRODUCT AND COMPANY IDENTIFICATION

Product Name	DEUTERIUM CHLORIDE
Product Code(s)	1055
UN-Number	UN3304
Recommended Use	Compressed gas.
Synonyms	Deuterated Hydrochloric Acid; Hydrochloric Acid-d; HCL - DEUTERATED
Supplier Address*	<p>Linde Gas North America LLC - Linde Merchant Production Inc. - Linde LLC            575 Mountain Ave.            Murray Hill, NJ 07974            Phone: 908-464-8100            www.lindeus.com</p> <p>Linde Gas Puerto Rico, Inc.            Las Palmas Village            Road No. 869, Street No. 7            Catano, Puerto Rico 00962            Phone: 787-641-7445            www.pr.lindegas.com</p> <p>Linde Canada Limited            5860 Chedworth Way            Mississauga, Ontario L5R 0A2            Phone: 905-501-1700            www.lindecana.com</p>
	* May include subsidiaries or affiliate companies/divisions.
	For additional product information contact your local customer service.
Chemical Emergency Phone Number	Chemtrec: 1-800-424-9300 for US/ 703-527-3887 outside US

### 2. HAZARDS IDENTIFICATION

<b>DANGER!</b>		
<b>Emergency Overview</b>		
Fatal if inhaled. Corrosive		
The product causes burns of eyes, skin and mucous membranes.		
Contents under pressure Keep at temperatures below 52°C / 125°F		
Appearance Colorless.	<b>Physical State</b> Compressed gas.	<b>Odor</b> Sharp, Suffocating

**OSHA Regulatory Status** This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

**Potential Health Effects**

<b>Principle Routes of Exposure</b>	Eye contact. Skin contact. Inhalation.
<b>Acute Toxicity</b>	
<b>Inhalation</b>	Fatal if inhaled. Inhalation of corrosive fumes/gases may cause coughing, choking, headache, dizziness, and weakness for several hours. Pulmonary edema may occur with tightness in the chest, shortness of breath, bluish skin, decreased blood pressure, and increased heart rate. Chemical pneumonitis and pulmonary edema result from exposure to the lower respiratory tract and deep lung. Residual pulmonary malfunction might occur.
<b>Eyes</b>	Corrosive to the eyes and may cause severe damage including blindness. Risk of serious damage to eyes.
<b>Skin</b>	Corrosive to skin. Reacts with water very rapidly yielding hydrochloric acid. Hydrogen chloride burns exhibit severe pain, redness, possible swelling and early necrosis.
<b>Skin Absorption Hazard</b>	No known hazard by skin absorption.
<b>Ingestion</b>	Not an expected route of exposure. Ingestion causes burns of the upper digestive and respiratory tract.
<b>Chronic Effects</b>	Chronic exposure to corrosive fumes/gases may cause erosion of the teeth followed by jaw necrosis. Bronchial irritation with chronic cough and frequent attacks of pneumonia are common. Gastrointestinal disturbances may also be seen. Avoid repeated exposure. Possible risks of irreversible effects.
<b>Aggravated Medical Conditions</b>	Pre-existing eye disorders. Skin disorders. Respiratory disorders.
<b>Environmental Hazard</b>	Very toxic to aquatic organisms. See Section 12 for additional Ecological Information.

**3. COMPOSITION/INFORMATION ON INGREDIENTS**

Chemical Name	CAS-No	Volume %	Chemical Formula
Deuterium chloride	7698-05-7	>99	DCl

**4. FIRST AID MEASURES**

<b>General Advice</b>	Immediate medical attention is required. Show this safety data sheet to the doctor in attendance.
<b>Eye Contact</b>	Immediate medical attention is required. In case of contact with substance, immediately flush eyes with running water for at least 30 minutes. Keep eye wide open while rinsing. Do not rub affected area.
<b>Skin Contact</b>	Immediate medical attention is required. Wash off immediately with soap and plenty of water for at least 30 minutes while removing all contaminated clothing and shoes.
<b>Inhalation</b>	PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF INHALATION OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Conscious inhalation victims should be assisted to an uncontaminated area and inhale fresh air. If breathing is difficult, administer oxygen. Unconscious persons should be moved to an uncontaminated area and, as necessary, given artificial resuscitation and supplemental oxygen. Treatment should be symptomatic and supportive.
<b>Ingestion</b>	None under normal use. Call a POISON CENTER or doctor/physician if exposed or you feel unwell.
<b>Notes to Physician</b>	Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated. Do not give chemical antidotes. Asphyxia from glottal edema may occur. Marked decrease in blood pressure may occur with moist rales, frothy sputum, and high pulse pressure. Treat symptomatically.

Protection of First-aiders Use personal protective equipment. Avoid contact with skin, eyes and clothing.

## 5. FIRE-FIGHTING MEASURES

Flammable Properties Not flammable.

Suitable Extinguishing Media Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Hazardous Combustion Products None.

### Explosion Data

Sensitivity to Mechanical Impact None

Sensitivity to Static Discharge None

Specific Hazards Arising from the Chemical Highly soluble in water-will react to yield dense, acrid HCL fumes. Continue to cool fire exposed cylinders until flames are extinguished. Cylinders may rupture under extreme heat. Damaged cylinders should be handled only by specialists.

Protective Equipment and Precautions for Firefighters As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Additional chemical protective clothing may be required to protect from toxic decomposition products.

## 6. ACCIDENTAL RELEASE MEASURES

Personal Precautions Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Use personal protective equipment. Avoid contact with skin, eyes and clothing.

Environmental Precautions Do not allow material to contaminate ground water system. Should not be released into the environment. Prevent further leakage or spillage if safe to do so.

Methods for Containment Stop the flow of gas or remove cylinder to outdoor location if this can be done without risk. If leak is in container or container valve, contact the appropriate emergency telephone number in Section 1 or call your closest Linde location.

Methods for Cleaning Up Return cylinder to Linde or an authorized distributor.

Other Information Refer to protective measures listed in Sections 7 and 8.

## 7. HANDLING AND STORAGE

Handling Use only in ventilated areas. Never attempt to lift a cylinder by its valve protection cap.  
Many metals corrode rapidly with wet hydrogen chloride.

Protect cylinders from physical damage; do not drag, roll, slide or drop. When moving cylinders, even for short distance, use a cart designed to transport cylinders. Use equipment rated for cylinder pressure. Use backflow preventive device in piping. Never insert an object (e.g. wrench, screwdriver, pry bar, etc.) into valve cap openings. Doing so may damage valve, causing leak to occur.

Use an adjustable strap wrench to remove over-tight or rusted caps. Close valve after each use and when empty. If user experiences any difficulty operating cylinder valve discontinue use and contact supplier.

Never put cylinders into trunks of cars or unventilated areas of passenger vehicles. Never attempt to refill a compressed gas cylinder without the owner's written consent. Never strike an arc on a compressed gas cylinder or make a cylinder a part of an electrical circuit.

#### Storage

Protect from physical damage. Cylinders should be stored upright with valve protection cap in place and firmly secured to prevent falling. Store in cool, dry, well-ventilated area of non-combustible construction away from heavily trafficked areas and emergency exits. Keep at temperatures below 52°C / 125°F. Full and empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders from being stored for excessive periods of time. Always store and handle compressed gas cylinders in accordance with Compressed Gas Association, pamphlet CGA-P1, Safe Handling of Compressed Gases in Containers. For additional storage recommendations, consult the CHLORINE INSTITUTE PAMPHLET 99 for Hydrogen Chloride.

## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

#### Exposure Guidelines

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Deuterium chloride 7698-05-7	Ceiling: 2 ppm	(vacated) Ceiling: 5 ppm (vacated) Ceiling: 7 mg/m <sup>3</sup> : 5 ppm: 7 mg/m <sup>3</sup>	50 ppm

*Immediately Dangerous to Life or Health.*

**Other Exposure Guidelines** Vacated limits revoked by the Court of Appeals decision in AFL-CIO v. OSHA, 965 F.2d 962 (11th Cir., 1992).

**Engineering Measures** Showers. Eyewash stations. Ventilation systems.

**Ventilation** Ensure adequate ventilation, especially in confined areas.

#### Personal Protective Equipment

**Eye/Face Protection** Tightly fitting safety goggles. Face-shield.

**Skin and Body Protection** Appropriate protective and chemical resistant gloves, clothing and splash protection, or fully encapsulating vapor protective clothing to prevent exposure. For materials of construction consult protective clothing manufacturer's specifications.

#### Respiratory Protection

**General Use** If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.

#### Hygiene Measures

When using, do not eat, drink or smoke. Remove and wash contaminated clothing before re-use. Provide regular cleaning of equipment, work area and clothing. Avoid contact with skin, eyes and clothing. For environmental protection, remove and wash all contaminated protective equipment before re-use. Keep away from food, drink and animal feeding stuffs.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Colorless.	Odor	Sharp, Suffocating.
Odor Threshold	No information available	Physical State	Compressed gas
Flash Point	No information available.	Autoignition Temperature	No information available.
Decomposition Temperature	No information available.	Boiling Point/Boiling Range	-85°C (-121°F)
Freezing Point	-114°C / -173°F	Molecular Weight	37.47
Water Solubility	0.823 vol/vol @ 0°C (32°F) and 1 atm	Evaporation Rate	No information available
Vapor Pressure	613 psi (4227 kPa) @ 70°F (21.1°C)	Vapor Density	1.3 @ 70°F
VOC Content (%)	Not applicable.	Flammability Limits in Air	
		Upper	Not applicable
		Lower	Not applicable

## 10. STABILITY AND REACTIVITY

Stability	Stable under recommended storage conditions.
Incompatible Products	Fluorine. Lithium silicide. Calcium carbide. Cesium carbide. Rubidium carbide.
Conditions to Avoid	Exposure to air or moisture over prolonged periods.
Hazardous Decomposition Products	Thermal decomposition can lead to release of irritating gases and vapors.
Hazardous Reactions	Highly soluble in water-will react to yield dense, acrid HCL fumes. Reacts vigorously with alkalis and many organic materials with liberation of heat. Strong oxidizers cause release of chlorine. Hydrochloric acid solutions react with metals to release flammable hydrogen gas.
Hazardous Polymerization	Hazardous polymerization does not occur.

## 11. TOXICOLOGICAL INFORMATION

### Acute Toxicity

LD50 Oral: 700 mg/kg (Rat)

LD50 Dermal:  
LD50 Dermal VALUE 5010 mg/kg (Rabbit)

LC50 Inhalation: Per CGA P-20:3120 ppm/ 1 hr. (Rat)

Inhalation Studies indicate that hydrogen chloride is immediately irritating to humans at concentrations of 5 ppm or greater. Thirty minute lethal exposures in experimental animals ranged from 2640 ppm to 4700 ppm hydrogen chloride vapor.

Skin Contact Hydrogen chloride gas will cause skin and eye damage at high concentrations. Direct contact with hydrochloric acid causes immediate burns.

Repeated Dose Toxicity No information available.

### Chronic Toxicity

Chronic Toxicity	Chronic exposure to corrosive fumes/gases may cause erosion of the teeth followed by jaw necrosis. Bronchial irritation with chronic cough and frequent attacks of pneumonia are common. Gastrointestinal disturbances may also be seen. Avoid repeated exposure. Possible risks of irreversible effects.
Carcinogenicity	The table below indicates whether each agency has listed any ingredient as a carcinogen.

IARC: (International Agency for Research on Cancer)  
 Group 3: Not Classifiable as to its Carcinogenicity to Humans

Irritation	No information available.
Sensitization	No information available.
Reproductive Toxicity	No information available.
Developmental Toxicity	No information available.
Teratogenic	Embryo and fetotoxicity has been observed in female rats exposed to maternally toxic levels of hydrogen chloride (302 ppm, 1hr.).
Synergistic Materials	None known.
Target Organ Effects	Eyes. Respiratory system. Skin.

## 12. ECOLOGICAL INFORMATION

### Ecotoxicity

Harmful to aquatic organisms.

Ozone depletion potential; ODP; (R-11 = 1): Does not contain ozone depleting chemical (40 CFR Part 82).

## 13. DISPOSAL CONSIDERATIONS

Waste Disposal Methods	Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to Linde for proper disposal.
Contaminated Packaging	Do not re-use empty containers.

## 14. TRANSPORT INFORMATION

### DOT

Proper shipping name	Compressed gas, toxic, corrosive, n.o.s.
Hazard Class	2.3
Subsidiary Class	8
UN-Number	UN3304
Description	UN3304, Compressed gas, toxic, corrosive, n.o.s. (Deuterium chloride), 2.3, (8)
Additional Description:	"Inhalation Hazard" Packing Requirements 173.304
Emergency Response Guide Number	123

TDG

Proper Shipping Name	Compressed gas, toxic, corrosive, n.o.s.
Hazard Class	2.3
Subsidiary Class	(8)
UN-Number	UN3304
Description	UN3304,COMPRESSED GAS, TOXIC, CORROSIVE, N.O.S.(Deuterium chloride ),2.3(8)

MEX

Proper Shipping Name	Compressed gas, toxic, corrosive, n.o.s.
Hazard Class	2.3
Subsidiary Class	8
UN-Number	UN3304
Description	UN3304 Compressed gas, toxic, corrosive, n.o.s.(Deuterium chloride ),2.3

IATA

UN-Number	UN3304
Proper Shipping Name	Compressed gas, toxic, corrosive, n.o.s.
Hazard Class	2.3
Subsidiary Class	8
ERG Code	2CP
Description	UN3304,Compressed gas, toxic, corrosive, n.o.s.(Deuterium chloride ),2.3(8)
Maximum Quantity for Passenger	Forbidden
Maximum Quantity for Cargo Only	Forbidden
Limited Quantity	No information available.

IMDG/IMO

Proper Shipping Name	Compressed gas, toxic, corrosive, n.o.s.
Hazard Class	2.3
Subsidiary Class	8
UN-Number	UN3304
EmS No.	F-C, S-U
Description	UN3304, Compressed gas, toxic, corrosive, n.o.s.(Deuterium chloride ),2.3(8)

ADR

Proper Shipping Name	Compressed gas, toxic, corrosive, n.o.s.
Hazard Class	2.3
UN-Number	UN3304
Classification Code	1TC
Description	UN3304 Compressed gas, toxic, corrosive, n.o.s.(Deuterium chloride ),2.3
ADR/RID-Labels	8

15. REGULATORY INFORMATION

International Inventories

TSCA	Does not Comply
DSL	Does not Comply
EINECS/ELINCS	Complies

NOTE: This product is exempt from TSCA.

**Legend**

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory

DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List

EINECS/ELINCS - European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances

**U.S. Federal Regulations****SARA 313**

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372:

Chemical Name	CAS-No	SARA 313 - Threshold Values %
Hydrogen chloride	7647-01-0	1.0

**SARA 311/312 Hazard Categories**

Acute Health Hazard	Yes
Chronic Health Hazard	No
Fire Hazard	No
Sudden Release of Pressure Hazard	Yes
Reactive Hazard	Yes

**Clean Water Act**

This product contains the following substances which are regulated pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42):

Chemical Name	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Hydrogen chloride	5000 lb			X

**Risk and Process Safety Management Programs**

This material, as supplied, contains one or more regulated substances with specified thresholds under 40 CFR Part 68 or regulated as a highly hazardous chemical pursuant to the 29 CFR Part 1910.110 with specified thresholds:

Chemical Name	U.S. - CAA (Clean Air Act) - Accidental Release Prevention - Toxic Substances	U.S. - CAA (Clean Air Act) - Accidental Release Prevention - Flammable Substances	U.S. - OSHA - Process Safety Management - Highly Hazardous Chemicals
Hydrogen chloride	5000 lbs		5000 lb

**Clean Air Act, Section 112 Hazardous Air Pollutants (HAPs) (see 40 CFR 61)**

This product contains the following substances which are listed hazardous air pollutants (HAPS) under Section 112 of the Clean Air Act:

Chemical Name	CAS-No	HAPS data	VOC Chemicals	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Hydrogen chloride	7647-01-0	X			

**CERCLA/SARA**

This material, as supplied, contains one or more substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355):

Chemical Name	Hazardous Substances RQs	Extremely Hazardous Substances RQs	TPQ
Hydrogen chloride	5000 lb	5000 lb	500 lb TPQ

**U.S. State Regulations**



**California Proposition 65**

This product does not contain any Proposition 65 chemicals.

**U.S. State Right-to-Know Regulations**

Chemical Name	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Hydrogen chloride	X	X	X	X	X

**International Regulations**

Chemical Name	Carcinogen Status	Exposure Limits
Hydrogen chloride		Mexico: Ceiling 5 ppm Mexico: Ceiling 7 mg/m <sup>3</sup>

**Canada**

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**

A Compressed gases

D1B Toxic materials

E Corrosive material



Chemical Name	NPRI
Hydrogen chloride	X

**Legend**

X - Listed

**16. OTHER INFORMATION**

Prepared By Product Stewardship  
23 British American Blvd.  
Latham, NY 12110  
1-800-572-6501

Issuing Date 22-Sep-2011

Revision Date

Revision Number 0

Revision Note Initial Release.

<u>NFPA</u>	Health Hazard 3	Flammability 0	Stability 0	Physical and Chemical Hazards -
<u>HMIS</u>	Health Hazard 3	Flammability 0	Physical Hazard 3	Personal Protection -

**Note:** Ratings were assigned in accordance with Compressed Gas Association (CGA) guidelines as published in CGA Pamphlet P-19-2009, CGA Recommended Hazard Ratings for Compressed Gases, 3rd Edition.

General Disclaimer

For terms and conditions, including limitation of liability, please refer to the purchase agreement in effect between Linde LLC, Linde Merchant Production, Inc. or Linde Gas North America LLC (or any of their affiliates and subsidiaries) and the purchaser.

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End of Safety Data Sheet