SILICON TETRAFLUORIDE
Safety Data Sheet

1. IDENTIFICATION

Product identifier
Product Name SILICON TETRAFLUORIDE

Other means of identification
Safety data sheet number LIND-P109
UN / ID no. UN1859
Synonyms Tetrafluorosilane; Silane, tetrafluoro-; Perfluorosilane; Silicon Fluoride

Recommended use of the chemical and restrictions on use
Recommended Use Industrial and professional use.
Uses advised against Consumer use

Details of the supplier of the safety data sheet
Linde Gas North America LLC - Linde Merchant Production Inc. - Linde LLC
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Murray Hill, NJ 07974
Phone: 908-464-8100
www.lindeus.com

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5860 Chedworth Way
Mississauga, Ontario L5R 0A2
Phone: 905-501-1700
www.lindecanada.com

* May include subsidiaries or affiliate companies / divisions.

For additional product information contact your local customer service.

Emergency telephone number
Company Phone Number 800-232-4726 (Linde National Operations Center, US)
905-501-0802 (Canada)
CHEMTREC: 1-800-424-9300 (North America) +1-703-527-3887 (International)

2. HAZARDS IDENTIFICATION

Classification

OSHA Regulatory Status
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200).

Acute toxicity - Inhalation (Gases)	Category 2
Skin corrosion / irritation	Category 1 Sub-category A
Serious eye damage / eye irritation	Category 1
Gases under pressure	Compressed gas

Label elements

Signal word Danger

Hazard Statements
Contains gas under pressure; may explode if heated
Fatal if inhaled
Causes severe skin burns and eye damage
Corrosive to the respiratory tract

Precautionary Statements - Prevention
Do not handle until all safety precautions have been read and understood
Do not breathe gas.
Do not get in eyes, on skin, or on clothing
Use and store only outdoors or in a well ventilated place
Wear protective gloves, protective clothing, eye protection, respiratory protection, and / or face protection
Use backflow preventive device in piping
Use only with equipment of compatible materials of construction and rated for cylinder pressure
Do not open valve until connected to equipment prepared for use
Close valve after each use and when empty
When returning cylinder, install leak tight valve outlet cap or plug

Precautionary Statements - Response
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or doctor / physician.
IF ON SKIN (or hair): Remove / Take off immediately all contaminated clothing. Rinse skin with water / shower. Wash contaminated clothing before reuse.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Immediately call a POISON CENTER or doctor / physician

Precautionary Statements - Storage
Store locked up
Protect from sunlight when ambient temperature exceeds 52°C / 125°F

Precautionary Statements - Disposal
Dispose of contents / containers in accordance with container supplier / owner instructions

Hazards not otherwise classified (HNOC)
Not applicable

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS No.	Volume %	Chemical Formula
Silicon Tetrafluoride	7783-61-1	100	SiF_4

4. FIRST AID MEASURES

Description of first aid measures

General advice — Immediate medical attention is required. Show this safety data sheet to the doctor in attendance.

Inhalation — Remove to fresh air and keep comfortable for breathing. If breathing is difficult, give oxygen. If breathing has stopped, give artificial respiration. Get medical attention immediately.

Skin contact — Immediately flush skin with plenty of water for at least 30 minutes. Remove contaminated clothing and shoes. Immediate medical attention is required. Dermal burns may be treated with calcium gluconate gel or slurry in water or glycerine. This compound binds the active fluorides in an insoluble form and limits burn extension and pain.

Eye contact — Immediately flush eyes with running water for at least 30 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Keep eye wide open while rinsing. Do not rub affected area. Immediate medical attention is required.

Ingestion — Not an expected route of exposure.

Self-protection of the first aider — RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Use personal protective equipment. Avoid contact with skin, eyes and clothing. Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

Most important symptoms and effects, both acute and delayed

Symptoms — 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. May cause burns of eyes, skin and mucous membranes. Symptoms may be delayed.

Indication of any immediate medical attention and special treatment needed

Note to physicians — For dermal exposure, the use of 2.5-33% calcium gluconate or carbonate gel or slurry has been recommended. The gel is either placed into a surgical glove into which the affected extremity is then placed or applied directly on the burn. This compound binds with the active fluorides in an insoluble form and limits burn extension and pain. Calcium chloride should not be used.

5. FIRE-FIGHTING MEASURES

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

Unsuitable extinguishing media	May react violently with water.

Specific extinguishing methods
Continue to cool fire exposed cylinders until flames are extinguished. Damaged cylinders should be handled only by specialists.

Specific hazards arising from the chemical
Non-flammable gas. Contact with water will cause hydrolysis to Hydrofluoric acid. Cylinders may rupture under extreme heat. The product causes burns of eyes, skin and mucous membranes. Thermal decomposition can lead to release of irritating and toxic gases and vapors. Do not allow run-off from fire fighting to enter drains or water courses. Runoff may pollute waterways.

Hazardous combustion products	Fluoride compounds.

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. Corrosive hazard. Wear chemically protective gloves / clothing and eye / face protection. Additional chemical protective clothing may be required to protect from toxic decomposition products.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal precautions	Evacuate personnel to safe areas. Keep people away from and upwind of spill / leak. Ensure adequate ventilation, especially in confined areas. Monitor concentration of released product. Use personal protection recommended in Section 8. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe.
Other Information	Gas / vapor is heavier than air. Prevent from entering sewers, basements and workpits, or any place where accumulation may be dangerous.

Environmental precautions

Environmental precautions	Prevent spreading of vapors through sewers, ventilation systems and confined areas. Prevent product from entering drains. See Section 12 for additional ecological information.

Methods and material for containment and cleaning up

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.

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on safe handling	Gasketing materials should be Teflon® or Kel-F®. Wetted surfaces should be passivated with an "active" fluorine compound to establish a metal fluoride coating for additional protection. Keep equipment scrupulously dry. Many of the metal fluorides are water soluble so that the passive film corrosion protection may be destroyed if wetted with water.

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. Never attempt to lift a cylinder by its valve protection cap. 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. Use only with adequate ventilation. Use backflow preventive device in piping. Use only with equipment rated for cylinder pressure. Close valve after each use and when empty. If user experiences any difficulty operating cylinder valve discontinue use and contact supplier. Ensure the complete gas system has been checked for leaks before use.

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.

Only experienced and properly instructed persons should handle gases under pressure. Always store and handle compressed gas cylinders in accordance with Compressed Gas Association, pamphlet CGA-P1, Safe Handling of Compressed Gases in Containers.

Conditions for safe storage, including any incompatibilities

Storage Conditions: 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. Cylinders should be stored upright with valve protection cap in place and firmly secured to prevent falling. Full and empty cylinders should be segregrated. Use a "first in-first out" inventory system to prevent full cylinders from being stored for excessive periods of time. Stored containers should be periodically checked for general condition and leakage.

Incompatible materials: Alkaline earth metals. Water. Moisture.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines .

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Silicon Tetrafluoride 7783-61-1	TWA: 2.5 mg / m³ F	TWA: 2.5 mg / m³ F	-

ACGIH TLV: American Conference of Governmental Industrial Hygienists - Threshold Limit Value. OSHA PEL: Occupational Safety and Health Administration - Permissible Exposure Limits. NIOSH IDLH: Immediately Dangerous to Life or Health.

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

Appropriate engineering controls

Engineering Controls: Showers. Eyewash stations. Ventilation systems. Exhaust gas should be vented to a gas treatment system. Consider installation of leak detection systems in areas of use and storage. Systems under pressure should be regularly checked for leakages.

Individual protection measures, such as personal protective equipment

Eye / face protection: Tightly fitting safety goggles. Face protection 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. Work gloves and safety shoes are recommended when handling cylinders.

Respiratory protection — 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.

General Hygiene Considerations — Handle in accordance with good industrial hygiene and safety practice. Do not get in eyes, on skin, or on clothing. Do not eat, drink or smoke when using this product. Wash hands before breaks and immediately after handling the product. Remove and wash contaminated clothing before re-use. Contaminated work clothing should not be allowed out of the workplace. Regular cleaning of equipment, work area and clothing is recommended.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical state	Compressed gas
Appearance	Colorless, Forms white fumes in humid air.
Odor	Sharp, Irritating.
Odor threshold	No information available
pH	If dissolved in water, will affect pH value
Melting point	-90 °C / -130 °F
Evaporation rate	Not applicable
Lower flammability limit:	Not applicable
Upper flammability limit:	Not applicable
Flash point	Not applicable
Autoignition temperature	No data available
Decomposition temperature	No data available
Water solubility	Hydrolyzes
Partition coefficient	No data available
Kinematic viscosity	Not applicable

Chemical Name	Molecular weight	Boiling point	Vapor Pressure	Vapor density (air =1)	Gas Density kg / m³@20°C	Critical Temperature
Silicon Tetrafluoride	104.07	-95.14 °C	Above critical temperature	3.55	-	-14.1 °C

10. STABILITY AND REACTIVITY

Reactivity
Not reactive under normal conditions

Chemical stability
Stable under normal conditions.

Explosion data
Sensitivity to Mechanical Impact None.
Sensitivity to Static Discharge None.

Possibility of Hazardous Reactions
Contact with water or moist air liberates irritating gas.

Conditions to avoid
Exposure to air or moisture over prolonged periods.

Incompatible materials
Alkaline earth metals. Water. Moisture.

Hazardous Decomposition Products
Hydrogen fluoride. Silicic acid.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Inhalation	Toxic effects observed in the respiratory system and kidneys of rats exposed at 300 ppm for 5 hours. Corrosive to respiratory system.
Skin contact	Corrosive. Causes severe irritation and or burns.
Eye contact	Corrosive to the eyes and may cause severe damage including blindness.
Ingestion	Not an expected route of exposure.

Information on toxicological effects

Symptoms	May be 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.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Skin corrosion / irritation	Category 1A.
Serious eye damage / eye irritation	Category 1.
Irritation	Causes severe irritation and or burns.
Corrosivity	Corrosive to living tissue.
Sensitization	Not classified.
Germ cell mutagenicity	Not classified.
Carcinogenicity	This product does not contain any carcinogens or potential carcinogens listed by OSHA, IARC or NTP.
Reproductive toxicity	Not classified.
STOT - single exposure	Not classified.
STOT - repeated exposure	Not classified.
Chronic toxicity	Extended low level systemic absorption of fluorides may cause fluorosis, an abnormal calcification pattern of the skeletal system. 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.
Target Organ Effects	Bone, Respiratory system, Eyes, Skin.
Aspiration hazard	Not applicable.

Numerical measures of toxicity

Chemical Name	Oral LD50	Dermal LD50	Inhalation LC50	Inhalation LC50 (CGA P-20)
Silicon Tetrafluoride 7783-61-1	-	-	-	922 ppm (Rat) 1hr

Product Information

Oral LD50	No information available
Dermal LD50	No information available
Inhalation LC50	No information available

The following values are calculated based on chapter 3.1 of the GHS document .

12. ECOLOGICAL INFORMATION

Ecotoxicity
No known acute aquatic toxicity.

Persistence and degradability
Not applicable.

Bioaccumulation
No information available.

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Disposal of wastes	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

UN / ID no.	UN1859
Proper shipping name	Silicon tetrafluoride
Hazard Class	2.3
Subsidiary class	8
Special Provisions	2
Description	UN1859, Silicon tetrafluoride, 2.3 (8)
Additional Description:	"Toxic-Inhalation Hazard Zone B"
Additional Marking Requirements:	"Inhalation Hazard"
Emergency Response Guide Number	125

TDG

UN / ID no.	UN1859
Proper shipping name	Silicon tetrafluoride
Hazard Class	2.3
Subsidiary class	8
Description	UN1859, Silicon tetrafluoride, 2.3 (8)

MEX

UN / ID no.	UN1859
Proper shipping name	Silicon tetrafluoride
Hazard Class	2.3
Subsidiary class	8
Description	UN1859, Silicon tetrafluoride, 2.3 (8)

IATA Forbidden

IMDG

UN / ID no.	UN1859
Proper shipping name	Silicon tetrafluoride
Hazard Class	2.3
Subsidiary hazard class	8
EmS-No.	F-C, S-U
Description	UN1859, Silicon tetrafluoride, 2.3 (8)

ADR

UN / ID no.	UN1859
Proper shipping name	Silicon tetrafluoride
Hazard Class	2.3
Classification code	2TC
Tunnel restriction code	(C / D)
Description	UN1859, Silicon tetrafluoride, 2.3 (8), (C / D)
Labels	8

15. REGULATORY INFORMATION

International Inventories

TSCA	Complies
DSL	Complies
EINECS / ELINCS	Complies

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 Chemical Substances / European List of Notified Chemical Substances

US Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

SARA 311 / 312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	No
Sudden release of pressure hazard	Yes
Reactive Hazard	No

CERCLA

This material, as supplied, does not contain any 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). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material.

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

This product does not contain any substances regulated as hazardous air pollutants (HAPS) under Section 112 of the Clean Air Act Amendments of 1990.

CWA (Clean Water Act)

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

Risk and Process Safety Management Programs

This material, as supplied, does not contain any regulated substances with specified thresholds under 40 CFR Part 68. This product does not contain any substances regulated as Highly Hazardous Chemicals pursuant to the 29 CFR Part 1910.110.

US State Regulations

California Proposition 65

This product does not contain any Proposition 65 chemicals

U.S. State Right-to-Know Regulations

Chemical Name	New Jersey	Massachusetts	Pennsylvania
Silicon Tetrafluoride 7783-61-1	X	-	X

International Regulations

Chemical Name	Carcinogenicity	Exposure Limits
Silicon Tetrafluoride		Mexico: TWA 2.5 mg / m^3

16. OTHER INFORMATION

NFPA Health hazards 3 Flammability 0 Instability 0 Physical and Chemical Properties W1**

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.

Issue Date	17-Mar-2015
Revision Date	17-Mar-2015
Revision Note	Initial Release.

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