

Safety Data Sheet

**Section 1: Identification of the Substance/Mixture and of the Company/Undertaking****1.1 Product identifier**

Product Name	Silicon Tetrachloride
Synonyms	Silicon Chloride, Tetrachlorosilane
CAS Number	10026-04-7
Product Code	10026-04-7/E-1
EC Number	233-054-0
Molecular Formula	:Si 1:Cl 4:

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

Relevant identified use(s)	Semiconductor Uses
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1.3 Details of the supplier of the safety data sheet

Manufacturer	Air Liquide 2700 Post Oak Blvd. Houston, TX 77056 United States www.us.airliquide.com sds@airliquide.com
Telephone (Technical)	713-896-2896
Telephone (Technical)	800-819-1704

1.4 Emergency telephone number

Manufacturer	800-424-9300 - CHEMTREC
Manufacturer	+1 703-527-3887 - Outside United States

Section 2: Hazards Identification**EU/EEC**

According to Regulation (EC) No 1272/2008 (CLP)/REACH 1907/2006 [amended by 453/2010]
According to EU Directive 67/548/EEC (DSD) or 1999/45/EC (DPD)

2.1 Classification of the substance or mixture

CLP	Skin Irritation 2 - H315 Eye Irritation 2 - H319 Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation - H335 EUH014
DSD/DPD	Irritant (Xi) R14, R36/37/38

2.2 Label Elements

CLP

WARNING

Hazard statements | H315 - Causes skin irritation
H319 - Causes serious eye irritation
H335 - May cause respiratory irritation
EUH014 - Reacts violently with water.

Precautionary statements

Prevention | P261 - Avoid breathing dust, fume, gas, mist, vapours and/or spray.
P264 - Wash thoroughly after handling.
P271 - Use only outdoors or in a well-ventilated area.
P280 - Wear protective gloves/protective clothing/eye protection/face protection.

Response | P304+P340 - IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P312 - Call a POISON CENTER or doctor/physician if you feel unwell.
P302+P352 - IF ON SKIN: Wash with plenty of soap and water.
P321 - Specific treatment, see supplemental first aid information.
P332+P313 - If skin irritation occurs: Get medical advice/attention.
P362 - Take off contaminated clothing and wash before reuse.
P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337+P313 - If eye irritation persists: Get medical advice/attention.

Storage/Disposal | P403+P233 - Store in a well-ventilated place. Keep container tightly closed.
P405 - Store locked up.
P501 - Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

DSD/DPD

Risk phrases | R14 - Reacts violently with water.
R36/37/38 - Irritating to eyes, respiratory system and skin.

Safety phrases | S7/8 - Keep container tightly closed and dry
S26 - In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

2.3 Other Hazards

CLP | According to Regulation (EC) No. 1272/2008 (CLP) this material is considered hazardous.

DSD/DPD | This product is considered dangerous according to the European Directive 67/548/EEC.

United States (US)

According to OSHA 29 CFR 1910.1200 HCS

2.1 Classification of the substance or mixture

OSHA HCS 2012 | Skin Corrosion 1B - H314
Serious Eye Damage 1 - H318
Specific Target Organ Toxicity Repeated Exposure 1 - H372
Hazards Not Otherwise Classified - Physical Hazard - Reacts violently with water

2.2 Label elements

OSHA HCS 2012

DANGER



Hazard statements | Causes severe skin burns and eye damage - H314
 Causes serious eye damage - H318
 Causes damage to organs through prolonged or repeated exposure. - H372

Precautionary statements

Prevention | Do not breathe mist/vapours/spray. - P260
 Wash thoroughly after handling. - P264
 Do not eat, drink or smoke when using this product. - P270
 Wear protective gloves/protective clothing/eye protection/face protection. - P280

Response | IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. - P304+P340
 Get medical advice/attention if you feel unwell. - P314
 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. - P303+P361+P353
 Specific treatment, see supplemental first aid information. - P321
 Wash contaminated clothing before reuse. - P363
 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. - P305+P351+P338
 Immediately call a POISON CENTER or doctor/physician. - P310
 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. - P301+P330+P331

Storage/Disposal | Store locked up. - P405
 Dispose of content and/or container in accordance with local, regional, national, and/or international regulations. - P501

2.3 Other hazards

OSHA HCS 2012 | Reacts violently with water. Under United States Regulations (29 CFR 1910.1200 - Hazard Communication Standard), this product is considered hazardous.

Canada

According to WHMIS

2.1 Classification of the substance or mixture

WHMIS | Other Toxic Effects - D2B
 Corrosive - E

2.2 Label elements

WHMIS



| Other Toxic Effects - D2B
 Corrosive - E

2.3 Other hazards

WHMIS

| Reacts violently with water.
 In Canada, the product mentioned above is considered hazardous under the Workplace Hazardous Materials Information System (WHMIS).

2.4 Other information

NFPA





Section 3 - Composition/Information on Ingredients

3.1 Substances

Composition				
Chemical Name	Identifiers	%	LD50/LC50	Classifications According to Regulation/Directive
Silicon chloride	CAS:10026-04-7 EC Number:233-054-0 EU Index:014-002-00-4	>= 99%	Inhalation-Rat LC50 • 8000 ppm 4 Hour(s)	EU DSD/DPD: Annex I: R14 Xi; R36/37/38 EU CLP: Annex VI: Skin Irrit. 2, H315; Eye Irrit. 2, H319; STOT SE 3, H335; EUH014 OSHA HCS 2012: Eye Dam. 1; Skin Corr. 1B; STOT RE 1 (Liver); HNOC - Physical Hazard - Reacts violently with water

3.2 Mixtures

- Material does not meet the criteria of a mixture in accordance with Regulation (EC) No 1272/2008.

Section 4 - First Aid Measures

4.1 Description of first aid measures

Inhalation

- Move victim to fresh air. Administer oxygen if breathing is difficult. Give artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Get medical attention immediately.

Skin

- For minor skin contact, avoid spreading material on unaffected skin. In case of contact with substance, immediately flush skin with running water for at least 20 minutes. Remove and isolate contaminated clothing. Get medical attention immediately.

Eye

- Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first five minutes, then continue rinsing eye. Get medical attention immediately.

Ingestion

- If swallowed, rinse mouth with water (only if the person is conscious) Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Give plenty of water to drink. Do not use mouth-to-mouth method if victim ingested the substance. Obtain medical attention immediately if ingested.

4.2 Most important symptoms and effects, both acute and delayed

- Refer to Section 11 - Toxicological Information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to Physician

- All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred.

Section 5 - Firefighting Measures

5.1 Extinguishing media

Suitable Extinguishing Media | LARGE FIRES: Dry chemical, CO₂, alcohol-resistant foam or water spray.
SMALL FIRES: Dry chemical, CO₂ or water spray.

Unsuitable Extinguishing Media | No data available

5.2 Special hazards arising from the substance or mixture

Unusual Fire and Explosion Hazards | Containers may explode when heated.
Acid reacts with most metals to release hydrogen gas, which can form explosive mixtures with air.
Reacts violently with water.
Substance will react with water (some violently), releasing corrosive and/or toxic gases.

Hazardous Combustion Products | Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive fumes.

5.3 Advice for firefighters

- | Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.
- | Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
- | Wear positive pressure self-contained breathing apparatus (SCBA).
- | SMALL FIRES: Move containers from fire area if you can do it without risk.
- | Runoff from fire control may cause pollution.

Section 6 - Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal Precautions | Ventilate enclosed areas. Do not walk through spilled material. Wear appropriate personal protective equipment, avoid direct contact. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

Emergency Procedures | ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. Do not get water inside container.

6.2 Environmental precautions

- | Prevent entry into waterways, sewers, basements or confined areas.

6.3 Methods and material for containment and cleaning up

Containment/Clean-up Measures | Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
Dike to collect large liquid spills.
A vapor suppressing foam may be used to reduce vapors.

6.4 Reference to other sections

- | Refer to Section 8 - Exposure Controls/Personal Protection and Section 13 - Disposal Considerations.

Section 7 - Handling and Storage

7.1 Precautions for safe handling

Handling | Handle and open container with care. Use only with adequate ventilation. Use caution when combining with water; DO NOT add water to corrosive liquid, ALWAYS add corrosive liquid to water while stirring to prevent release of heat, steam and fumes.
Wear appropriate personal protective equipment, avoid direct contact. Do not breathe mist, vapours, spray. Do not get in eyes, on skin, or on clothing. Wash thoroughly with soap and water after handling and before eating, drinking, or using tobacco.

7.2 Conditions for safe storage, including any incompatibilities

- Storage**
- Keep container tightly closed. Store in a cool, dry, well-ventilated place. Keep away from incompatible materials. Inspect all incoming containers before storage, to ensure containers are properly labeled and not damaged.

7.3 Specific end use(s)

- Refer to Section 1.2 - Relevant identified uses.

Section 8 - Exposure Controls/Personal Protection

8.1 Control parameters

- Exposure Limits/Guidelines**
- Currently there are no applicable exposure limits established for this material.

8.2 Exposure controls

- Engineering Measures/Controls**
- Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Personal Protective Equipment

Respiratory

- Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or symptoms are experienced.

Eye/Face

- Wear chemical splash safety goggles.

Skin/Body

- Wear appropriate gloves.

Environmental Exposure Controls

- Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways. Follow best practice for site management and disposal of waste.

Section 9 - Physical and Chemical Properties

9.1 Information on Physical and Chemical Properties

Material Description			
Physical Form	Liquid	Appearance/Description	Colorless liquid with a pungent odor.
Color	Colorless	Odor	Pungent
Odor Threshold	1 to 5 ppm		
General Properties			
Boiling Point	56.8 C(134.24 F)	Melting Point	-70 C(-94 F)
Decomposition Temperature	Data lacking	pH	Data lacking
Specific Gravity/Relative Density	1.48 Water=1	Water Solubility	Decomposes
Viscosity	Data lacking	Explosive Properties	Not explosive.
Oxidizing Properties:	Not an oxidizer.		
Volatility			
Vapor Pressure	257 hPa @ 20 C(68 F)	Vapor Density	> 1 Air=1
Evaporation Rate	Data lacking		
Flammability			
Flash Point	Data lacking	UEL	Data lacking
LEL	Data lacking	Autoignition	Data lacking
Flammability (solid, gas)	Not flammable.		
Environmental			
Octanol/Water Partition coefficient	Data lacking		

9.2 Other Information

- No additional physical and chemical parameters noted.

Section 10: Stability and Reactivity

10.1 Reactivity

- No dangerous reaction known under conditions of normal use.

10.2 Chemical stability

- Stable

10.3 Possibility of hazardous reactions

- Hazardous polymerization will not occur.

10.4 Conditions to avoid

- Excess heat.

10.5 Incompatible materials

- Alcohols, strong acids, strong bases, and water. Avoid contact with metals. Reacts violently with potassium and sodium.

10.6 Hazardous decomposition products

- Hydrogen chloride gas, silicon oxide.

Section 11 - Toxicological Information

11.1 Information on toxicological effects

	CAS	
Silicon Tetrachloride	10026-04-7	Acute Toxicity: Inhalation-Rat LC50 • 8000 ppm 4 Hour(s); Irritation: Eye-Rabbit • 20 mg 24 Hour(s) • Moderate irritation; Skin-Rabbit • 500 mg 24 Hour(s) • Severe irritation

GHS Properties	Classification
Acute toxicity	EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met
Aspiration Hazard	EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met
Carcinogenicity	EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met
Germ Cell Mutagenicity	EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met
Skin corrosion/Irritation	EU/CLP • Skin Irritation 2 OSHA HCS 2012 • Skin Corrosion 1B
Skin sensitization	EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met
STOT-RE	EU/CLP • Classification criteria not met OSHA HCS 2012 • Specific Target Organ Toxicity Repeated Exposure 1

STOT-SE	EU/CLP • Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation OSHA HCS 2012 • Classification criteria not met
Toxicity for Reproduction	EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met
Respiratory sensitization	EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met
Serious eye damage/Irritation	EU/CLP • Eye Irritation 2 OSHA HCS 2012 • Serious Eye Damage 1

Potential Health Effects

Inhalation

- Acute (Immediate)** | May cause corrosive burns - irreversible damage.
- Chronic (Delayed)** | Repeated or prolonged exposure to corrosive fumes may cause bronchial irritation with chronic cough.

Skin

- Acute (Immediate)** | Causes severe skin burns and eye damage.
- Chronic (Delayed)** | Repeated or prolonged exposure to corrosive materials will cause dermatitis.

Eye

- Acute (Immediate)** | Causes serious eye damage.
- Chronic (Delayed)** | Repeated or prolonged exposure to corrosive materials or fumes may cause conjunctivitis.

Ingestion

- Acute (Immediate)** | May cause irreversible damage to mucous membranes.
- Chronic (Delayed)** | Repeated or prolonged exposure to corrosive materials or fumes may cause gastrointestinal disturbances.

Key to abbreviations

LC = Lethal Concentration

LD = Lethal Dose

TC = Toxic Concentration

Section 12 - Ecological Information

12.1 Toxicity

- | Material data lacking.

12.2 Persistence and degradability

- | Material data lacking.

12.3 Bioaccumulative potential

- | Material data lacking.

12.4 Mobility in Soil

- | Material data lacking.

12.5 Results of PBT and vPvB assessment

- | No PBT and vPvB assessment has been conducted.

12.6 Other adverse effects

- | No studies have been found.

Section 13 - Disposal Considerations

13.1 Waste treatment methods

- Product waste** | Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.
- Packaging waste** | Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Section 14 - Transport Information

	14.1 UN number	14.2 UN proper shipping name	14.3 Transport hazard class(es)	14.4 Packing group	14.5 Environmental hazards
DOT	UN1818	Silicon tetrachloride	8	II	NDA
TDG	UN1818	SILICON TETRACHLORIDE	8	II	NDA
IMO/IMDG	UN1818	SILICON TETRACHLORIDE	8	II	NDA
IATA/ICAO	NDA	Forbidden	NDA	NDA	NDA

14.6 Special precautions for user | None known.

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code | Not relevant.

Section 15 - Regulatory Information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

SARA Hazard Classifications | Acute

State Right To Know				
Component	CAS	MA	NJ	PA
Silicon chloride	10026-04-7	No	Yes	No

Inventory						
Component	CAS	Canada DSL	Canada NDSL	China	EU EINECS	EU ELNICS
Silicon chloride	10026-04-7	Yes	No	Yes	Yes	No

Inventory (Con't.)		
Component	CAS	TSCA
Silicon chloride	10026-04-7	Yes

Canada

Labor

Canada - WHMIS - Classifications of Substances

• Silicon chloride 10026-04-7 Not Listed

Canada - WHMIS - Ingredient Disclosure List

• Silicon chloride 10026-04-7 1 %

Environment**Canada - CEPA - Priority Substances List**

• Silicon chloride	10026-04-7	Not Listed
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China**Environment****China - Ozone Depleting Substances - First Schedule**

• Silicon chloride	10026-04-7	Not Listed
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China - Ozone Depleting Substances - Second Schedule

• Silicon chloride	10026-04-7	Not Listed
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China - Ozone Depleting Substances - Third Schedule

• Silicon chloride	10026-04-7	Not Listed
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Other**China - Annex I & II - Controlled Chemicals Lists**

• Silicon chloride	10026-04-7	Not Listed
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China - Dangerous Goods List

• Silicon chloride	10026-04-7	
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China - Export Control List - Part I Chemicals

• Silicon chloride	10026-04-7	Not Listed
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Europe**Other****EU - CLP (1272/2008) - Annex VI - Table 3.2 - Classification**

• Silicon chloride	10026-04-7	R14 Xi; R36/37/38
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EU - CLP (1272/2008) - Annex VI - Table 3.2 - Concentration Limits

• Silicon chloride	10026-04-7	Not Listed
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EU - CLP (1272/2008) - Annex VI - Table 3.2 - Labelling

• Silicon chloride	10026-04-7	Xi R:14-36/37/38 S:(2)-7/8-26
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EU - CLP (1272/2008) - Annex VI - Table 3.2 - Notes - Substances and Preparations

• Silicon chloride	10026-04-7	Not Listed
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EU - CLP (1272/2008) - Annex VI - Table 3.2 - Safety Phrases

• Silicon chloride	10026-04-7	S:(2)-7/8-26
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Germany**Environment****Germany - TA Luft - Types and Classes**

• Silicon chloride	10026-04-7	Not Listed
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Germany - Water Classification (VwVwS) - Annex 1

• Silicon chloride	10026-04-7	Not Listed
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Germany - Water Classification (VwVwS) - Annex 2 - Water Hazard Classes

• Silicon chloride	10026-04-7	ID Number 557, hazard class 1 - low hazard to waters
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(footnote 13)

Germany - Water Classification (VwVwS) - Annex 3

- Silicon chloride

10026-04-7

Not Listed

Other**Germany - Specifically Regulated Chemicals in TRGS**

- Silicon chloride

10026-04-7

Not Listed

Portugal**Other****Portugal - Prohibited Substances**

- Silicon chloride

10026-04-7

Not Listed

United Kingdom**Environment****United Kingdom - Pollution Inventory - Schedule 1 - Thresholds for Releases to Air**

- Silicon chloride

10026-04-7

Not Listed

Other**United Kingdom - Workplace Exposure Limits (WELs) - Substances in Review**

- Silicon chloride

10026-04-7

Not Listed

United Kingdom - List of Dangerous Substances in Water

- Silicon chloride

10026-04-7

Not Listed

United States**Labor****U.S. - OSHA - Process Safety Management - Highly Hazardous Chemicals**

- Silicon chloride

10026-04-7

Not Listed

U.S. - OSHA - Specifically Regulated Chemicals

- Silicon chloride

10026-04-7

Not Listed

Environment**U.S. - CAA (Clean Air Act) - 1990 Hazardous Air Pollutants**

- Silicon chloride

10026-04-7

Not Listed

U.S. - CERCLA/SARA - Hazardous Substances and their Reportable Quantities

- Silicon chloride

10026-04-7

Not Listed

U.S. - CERCLA/SARA - Radionuclides and Their Reportable Quantities

- Silicon chloride

10026-04-7

Not Listed

U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances EPCRA RQs

- Silicon chloride

10026-04-7

Not Listed

U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances TPQs

- Silicon chloride

10026-04-7

Not Listed

U.S. - CERCLA/SARA - Section 313 - Emission Reporting

- Silicon chloride

10026-04-7

Not Listed

U.S. - CERCLA/SARA - Section 313 - PBT Chemical Listing

• Silicon chloride

10026-04-7

Not Listed

United States - California**Environment****U.S. - California - Proposition 65 - Carcinogens List**

• Silicon chloride

10026-04-7

Not Listed

U.S. - California - Proposition 65 - Developmental Toxicity

• Silicon chloride

10026-04-7

Not Listed

U.S. - California - Proposition 65 - Maximum Allowable Dose Levels (MADL)

• Silicon chloride

10026-04-7

Not Listed

U.S. - California - Proposition 65 - No Significant Risk Levels (NSRL)

• Silicon chloride

10026-04-7

Not Listed

U.S. - California - Proposition 65 - Reproductive Toxicity - Female

• Silicon chloride

10026-04-7

Not Listed

U.S. - California - Proposition 65 - Reproductive Toxicity - Male

• Silicon chloride

10026-04-7

Not Listed

United States - Pennsylvania**Labor****U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List**

• Silicon chloride

10026-04-7

Not Listed

U.S. - Pennsylvania - RTK (Right to Know) - Special Hazardous Substances

• Silicon chloride

10026-04-7

Not Listed

15.2 Chemical Safety Assessment

| No Chemical Safety Assessment has been carried out.

Section 16 - Other Information**Last Revision Date**

| 08/December/2014

Preparation Date

| 08/December/2014

Disclaimer/Statement of Liability

| To the best of Air Liquide's knowledge, the information contained herein is reliable and accurate as of this date; however, accuracy, suitability or completeness are not guaranteed and no warranties of any type, either express or implied, are provided. The information contained herein relates only to this specific product. If this gas mixture is combined with other materials, all component properties must be considered. Data may be changed from time to time. Be sure to consult the latest edition.

Key to abbreviations

NDA = No data available