

# Safety Data Sheet 907087

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

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Version: 2.1

# **SECTION 1: Identification**

Identification

Product form : Substance Substance name : Fluorine CAS-No. 7782-41-4 SG-1001-08336 Product code

Formula

#### 1.2. Recommended use and restrictions on use

Use of the substance/mixture : Laboratory chemicals

Manufacture of substances

### Supplier

Air Liquide USA LLC and its affiliates 9811 Katy Freeway, Suite 100 Houston, TX 77024 - USA T 1-800-819-1704 www.us.airliquide.com

#### **Emergency telephone number**

Emergency number : Chemtrec: 1-800-424-9300

### SECTION 2: Hazard(s) identification

#### Classification of the substance or mixture

#### **GHS US classification**

Oxidizing gases Category 1 May cause or intensify fire; oxidizer H270

Contains gas under pressure; may explode if heated Gases under pressure H280

Compressed gas Acute toxicity H330 Fatal if inhaled

(inhalation:gas) Category 1

Skin corrosion/irritation H314

Category 1A

Serious eye damage/eye

H318 irritation Category 1 Specific target organ H335

toxicity (single exposure)

Category 3

Full text of H statements : see section 16

Causes severe skin burns and eye damage

Causes serious eye damage

May cause respiratory irritation

# GHS Label elements, including precautionary statements

### **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

H318 - Causes serious eye damage

H330 - Fatal if inhaled

CGA-HG22 - Corrosive to the respiratory tract

CGA-HG23 - Extremely reactive.

: P202 - Do not handle until all safety precautions have been read and understood. Precautionary statements (GHS US)

P220 - Keep/Store away from Combustible materials, clothing

P260 - Do not breathe gas.

P271 - Use only outdoors or in a well-ventilated area.

P280 - Wear eye protection, face protection, protective gloves, protective clothing.

P303+P361+P353 - If on skin (or hair): Take off immediately all contaminated clothing. Rinse

skin with water/shower

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P305+P351+P338 - If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing

P403 - Store in a well-ventilated place.

P405 - Store locked up.

 $P501-Dispose\ of\ contents/container\ in\ accordance\ with\ local/regional/national/international$ 

regulations

P244 - Keep reduction valves/valves and fittings free from oil and grease

P304+P340 - If inhaled: Remove person to fresh air and keep comfortable for breathing

P370+P376 - In case of fire: Stop leak if safe to do so. P307+P311 - If exposed: Call a poison center/doctor

P284 - Wear respiratory protection. Consult respirator supplier's product information for the

selection of the appropriate respiratory protection.

CGA-PG02 - Protect from sunlight when ambient temperature exceeds 52°C/125 °F

CGA-PG05 - Use a back flow preventive device in the piping CGA-PG06 - Close valve after each use and when empty

CGA-PG10 - Use only with equipment rated for cylinder pressure

CGA-PG14 - Approach suspected leak area with caution

CGA-PG18 - When returning cylinder, install leak tight valve outlet cap or plug

CGA-PG20 - Use only with equipment of compatible materials of construction and rated for cylinder pressure

CGA-PG21 - Open valve slowly

CGA-PG22 - Use only with equipment cleaned for oxygen service CGA-PG32 - Use only with equipment passivated before use.

#### 2.3. Other hazards which do not result in classification

No additional information available

#### 2.4. Unknown acute toxicity (GHS US)

Not applicable

# **SECTION 3: Composition/Information on ingredients**

#### 3.1. Substances

Substance type : Mono-constituent

Name	Product identifier	%	GHS US classification
Fluorine (Main constituent)	(CAS-No.) 7782-41-4	> 99.9	Ox. Gas 1, H270 Press. Gas (Comp.), H280 Acute Tox. 1 (Inhalation:gas), H330 Skin Corr. 1A, H314 Eye Dam. 1, H318 STOT SE 3, H335

Full text of hazard classes and H-statements : see section 16

## 3.2. Mixtures

Not applicable

#### **SECTION 4: First-aid measures**

### 4.1. Description of first aid measures

First-aid measures after inhalation

: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Apply artificial respiration with bag and mask if breathing stopped. Get immediate medical

advice/attention.

First-aid measures after skin contact : Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. In case

of skin contact, wearing rubber gloves rub 2.5% calcium gluconate gel continuously into the affected area for 1.5 hours or until further medical care is available. Wash contaminated

clothing before reuse. Get immediate medical advice/attention.

First-aid measures after eye contact : Rinse immediately with plenty of water for 15 minutes. Remove contact lenses, if present and

easy to do. Continue rinsing. Get immediate medical advice/attention.

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

#### 4.2. Most important symptoms and effects (acute and delayed)

Symptoms/effects after inhalation : Fatal if inhaled. Corrosive to the respiratory tract.

Symptoms/effects after skin contact : Causes severe skin burns and eye damage.

Symptoms/effects after eye contact : Causes serious eye damage.

Symptoms/effects after ingestion : Ingestion is not considered a potential route of exposure.

Symptoms/effects upon intravenous : Not known.

administration

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Most important symptoms and effects, both

acute and delayed

Chronic symptoms

: Prolonged exposure to small concentrations may result in pulmonary oedema. May cause severe chemical burns to skin and cornea. Suitable first-aid treatment should be immediately available. Seek medical advice before using product. Delayed adverse effects possible. Refer to section 11.

: Adverse effects not expected from this product.

#### 4.3. Immediate medical attention and special treatment, if necessary

If you feel unwell, seek medical advice. If breathing is difficult, give oxygen.

# **SECTION 5: Fire-fighting measures**

### 5.1. Suitable (and unsuitable) extinguishing media

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

Unsuitable extinguishing media : Do not use water jet to extinguish.

#### 5.2. Specific hazards arising from the chemical

Fire hazard : The product is not flammable.

Explosion hazard : Product is not explosive. Heat may build pressure, rupturing closed containers, spreading fire

and increasing risk of burns and injuries.

Reactivity : Reacts violently with water. Reacts with water to form corrosive acids.

Hazardous combustion products : None that are more hazardous than the product itself.

### 5.3. Special protective equipment and precautions for fire-fighters

Firefighting instructions : In case of fire: Evacuate area. Fight fire remotely due to the risk of explosion. Use water spray

or fog for cooling exposed containers. Exercise caution when fighting any chemical fire.

Protection during firefighting : Standard protective clothing and equipment (e.g, Self Contained Breathing Apparatus) for fire

fighters. Do not enter fire area without proper protective equipment, including respiratory

protection.

# **SECTION 6: Accidental release measures**

### 6.1. Personal precautions, protective equipment and emergency procedures

General measures : Ensure adequate ventilation.

#### 6.1.1. For non-emergency personnel

Protective equipment : Wear protective equipment consistent with the site emergency plan.

Emergency procedures : Evacuate personnel to a safe area. Close doors and windows of adjacent premises. Keep

containers closed. Mark the danger area. Seal off low-lying areas. Keep upwind.

### 6.1.2. For emergency responders

Protective equipment : Standard protective clothing and equipment (e.g, Self Contained Breathing Apparatus) for fire

fighters. Equip cleanup crew with proper protection.

Emergency procedures : Evacuate and limit access. Ventilate area.

# 6.2. Environmental precautions

Try to stop release if without risk.

### 6.3. Methods and material for containment and cleaning up

For containment : Try to stop release if without risk.

Methods for cleaning up : Dispose of contents/container in accordance with local/regional/national/international

regulations

Methods and material for containment and

cleaning up

: Hose down area with water. Ventilate area. Wash contaminated equipment or sites of leaks with copious quantities of water.

### 6.4. Reference to other sections

See also Sections 8 and 13.

# **SECTION 7: Handling and storage**

#### 7.1. Precautions for safe handling

Additional hazards when processed : Pressurized container: Do not pierce or burn, even after use. Use only with equipment rated for

cylinder pressure. Close valve after each use and when empty.

Precautions for safe handling : Do not handle until all safety precautions have been read and understood. Use only outdoors or

in a well-ventilated area.

Hygiene measures : Do not eat, drink or smoke when using this product.

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#### Conditions for safe storage, including any incompatibilities

Technical measures

: Comply with applicable regulations.

Storage conditions

: Do not expose to temperatures exceeding 52 °C/ 125 °F. Keep container closed when not in use. Protect cylinders from physical damage; do not drag, roll, slide or drop. Store in well

ventilated area. Store locked up.

Incompatible products

None known.

Incompatible materials

Flammable materials. Combustible materials. Reducing agents.

Conditions for safe storage, including any

incompatibilities

Observe all regulations and local requirements regarding storage of containers. Containers should not be stored in conditions likely to encourage corrosion. Container valve guards or caps should be in place. Containers should be stored in the vertical position and properly secured to prevent them from falling over. Stored containers should be periodically checked for general condition and leakage. Keep container below 50°C in a well ventilated place. Segregate from flammable gases and other flammable materials in store. Store containers in location free from fire risk and away from sources of heat and ignition. Keep away from combustible materials.

### **SECTION 8: Exposure controls/personal protection**

#### **Control parameters**

Fluorine (7782-41-4)		
ACGIH	ACGIH TWA (ppm)	1 ppm
ACGIH	ACGIH STEL (ppm)	2 ppm
OSHA	OSHA PEL (TWA) (mg/m³)	0.2 mg/m³
OSHA	OSHA PEL (TWA) (ppm)	0.1 ppm
IDLH	US IDLH (ppm)	25 ppm
NIOSH	NIOSH REL (TWA) (mg/m³)	0.2 mg/m³
NIOSH	NIOSH REL (TWA) (ppm)	0.1 ppm

### Appropriate engineering controls

Appropriate engineering controls

: Ensure exposure is below occupational exposure limits (where available). Provide adequate general and local exhaust ventilation. Systems under pressure should be regularly checked for leakages. Consider the use of a work permit system e.g. for maintenance activities. Alarm detectors should be used when toxic gases may be released.

Environmental exposure controls

Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment.

#### Individual protection measures/Personal protective equipment 8.3.

# Hand protection:

Wear working gloves when handling gas containers. 29 CFR 1910.138: Hand protection. Wear chemically resistant protective gloves when making or breaking process connections.

### Eye protection:

Wear safety glasses with side shields. 29 CFR 1910.133: Eye and Face Protection. Wear goggles and a face shield when transfilling or breaking transfer connections.

### Skin and body protection:

Wear suitable protective clothing, e.g. lab coats, coveralls or flame resistant clothing.

### Respiratory protection:

Wear a respirator when performing non-routine tasks not limited to line breaking or sampling. Wear a respirator during routine operations if determined to be necessary during a process-specific review. Consult respirator suppliers' product information or their representatives for the selection of the appropriate respirator. See Sections 5 & 6.

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### Thermal hazard protection:

None necessary during normal and routine operations.

#### Other information:

Wear safety shoes while handling containers. Keep suitable chemically resistant protective clothing readily available for emergency use. 29 CFR 1910.136: Foot Protection.

## SECTION 9: Physical and chemical properties

#### 9.1. Information on basic physical and chemical properties

Physical state : Gas

Appearance : Pale yellow to greenish gas.
Color : Pale yellow to greenish

Odor : Pungent.

Odor threshold : No data available

pH : If dissolved in water pH-value will be affected.

Melting point : No data available

Freezing point : -220 °C

Boiling point : No data available

Critical temperature : -129 °C
Critical pressure : 5172 kPa

Flash point : Not applicable (non-flammable gas)

Relative evaporation rate (butyl acetate=1) : No data available

Relative evaporation rate (ether=1) : Not applicable for gases and gas mixtures.

Flammability (solid, gas) : See Section 2.1 and 2.2

Vapor pressure : No data available
Relative vapor density at 20 °C : No data available
Relative density : No data available

Molecular mass : 38 g/mol
Relative gas density : Heavier than air

Solubility : Water: No data available

Log Pow : Not applicable for inorganic products.

Auto-ignition temperature : No data available
Decomposition temperature : No data available
Viscosity, kinematic : No data available
Viscosity, dynamic : Not applicable.

Explosion limits : Not applicable (non-flammable gas)
Explosive properties : Not applicable (non-flammable gas).

Oxidizing properties : May intensify fire; oxidizer.

Ci : 7.56

#### 9.2. Other information

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

Reacts violently with water. Reacts with water to form corrosive acids.

# 10.2. Chemical stability

May intensify fire; oxidizer.

# 10.3. Possibility of hazardous reactions

Violently oxidises organic material. May react violently with reducing agents. Reacts with water to form corrosive acids.

### 10.4. Conditions to avoid

Avoid moisture in installation systems.

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### 10.5. Incompatible materials

Moisture. May react violently with alkalis. With water causes rapid corrosion of some metals. Reacts with water to form corrosive acids. May react violently with combustible materials. May react violently with reducing agents.

#### 10.6. Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced.

## **SECTION 11: Toxicological information**

#### 11.1. Information on toxicological effects

Acute toxicity (oral) : Not classified

Acute toxicity (dermal) : Not classified

Acute toxicity (inhalation) : Inhalation:gas: Fatal if inhaled.

Fluorine (7782-41-4)	
LC50 inhalation rat (ppm)	92.5 ppm/4h
ATE US (gases)	92.5 ppmV/4h

Skin corrosion/irritation : Causes severe skin burns and eye damage.

pH: If dissolved in water pH-value will be affected.

Serious eye damage/irritation : Causes serious eye damage.

pH: If dissolved in water pH-value will be affected.

Respiratory or skin sensitization : Not classified Germ cell mutagenicity : Not classified Carcinogenicity : Not classified Reproductive toxicity : Not classified

Specific target organ toxicity – single exposure : May cause respiratory irritation.

Specific target organ toxicity - repeated

exposure

: Not classified

Aspiration hazard : Not classified
Viscosity, kinematic : No data available

Symptoms/effects after inhalation : Fatal if inhaled. Corrosive to the respiratory tract. Symptoms/effects after skin contact : Causes severe skin burns and eye damage.

Symptoms/effects after eye contact : Causes serious eye damage.

Symptoms/effects after ingestion : Ingestion is not considered a potential route of exposure.

Symptoms/effects upon intravenous

administration

: Not known.

Most important symptoms and effects, both

acute and delayed

: Prolonged exposure to small concentrations may result in pulmonary oedema. May cause severe chemical burns to skin and cornea. Suitable first-aid treatment should be immediately available. Seek medical advice before using product. Delayed adverse effects possible. Refer

to section 11.

Chronic symptoms : Adverse effects not expected from this product.

# **SECTION 12: Ecological information**

# 12.1. Toxicity

Ecology - general : No data available.

# 12.2. Persistence and degradability

Fluorine (7782-41-4)	
Persistence and degradability	Not applicable for inorganic products

### 12.3. Bioaccumulative potential

Fluorine (7782-41-4)	
Log Pow	Not applicable for inorganic products.
Bioaccumulative potential	No data available.

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Fluorine (7782-41-4)	
Ecology - soil	Because of its high volatility, the product is unlikely to cause ground or water pollution.

#### Other adverse effects

Effect on ozone layer : No known effects from this product.

# **SECTION 13: Disposal considerations**

# **Disposal methods**

Waste treatment methods : Contact supplier if guidance is required. Do not discharge into any place where its

accumulation could be dangerous. Ensure that the emission levels from local regulations or

operating permits are not exceeded.

Refer to the CGA Pamphlet P-63 "Disposal of Gases" available at www.cganet.com for Product/Packaging disposal recommendations

more guidance on suitable disposal methods.

# **SECTION 14: Transport information**

#### **Department of Transportation (DOT)**

In accordance with DOT

Transport document description : UN1045 Fluorine, compressed, 2.3 (5.1;8)

UN-No.(DOT) : UN1045

Proper Shipping Name (DOT) : Fluorine, compressed

Class (DOT) : 2.3 - Class 2.3 - Poisonous gas 49 CFR 173.115

: 5.1 - Class 5.1 - Oxidizer 49 CFR 173.128,8 - Class 8 - Corrosive material 49 CFR 173.136 Subsidiary risk (DOT)

Hazard labels (DOT) : 2.3 - Poison gas 5.1 - Oxidiser

8 - Corrosive







DOT Packaging Non Bulk (49 CFR 173.xxx) : 302 DOT Packaging Bulk (49 CFR 173.xxx) : None

DOT Special Provisions (49 CFR 172.102) : 1 - This material is poisonous by inhalation (see 171.8 of this subchapter) in Hazard Zone A

(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.

N86 - UN pressure receptacles made of aluminum alloy are not authorized.

DOT Packaging Exceptions (49 CFR 173.xxx) None

DOT Quantity Limitations Passenger aircraft/rail : Forbidden

(49 CFR 173.27)

DOT Quantity Limitations Cargo aircraft only (49 : Forbidden

CFR 175.75)

**DOT Vessel Stowage Location** 

: D - The material must be stowed "on deck only" on a cargo vessel and on a passenger vessel carrying a number of passengers limited to not more than the larger of 25 passengers or one passenger per each 3 m of overall vessel length, but the material is prohibited on passenger

vessels in which the limiting number of passengers is exceeded.

**DOT Vessel Stowage Other** 40 - Stow "clear of living quarters",89 - Segregation same as for oxidizers,90 - Stow "separated

from" radioactive materials

Emergency Response Guide (ERG) Number

Other information

: 124 (UN1045)

: No supplementary information available.

: Avoid transport on vehicles where the load space is not separated from the driver's Special transport precautions 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.

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#### **Transportation of Dangerous Goods**

Transport document description : UN1045 FLUORINE, COMPRESSED, 2.3 (5.1;8)

UN-No. (TDG) : UN1045

Proper Shipping Name : FLUORINE, COMPRESSED TDG Primary Hazard Classes : 2.3 - Class 2.3 - Toxic Gas.

TDG Subsidiary Classes

**TDG Special Provisions** 23 - (1) A consignor of these dangerous goods must include, except for UN1005,

ANHYDROUS AMMONIA, the words "toxic by inhalation" or "toxic — inhalation hazard" or "toxique par inhalation" or "toxicité par inhalation" in the following places, unless the words are already part of the shipping name: (a)on a shipping document, immediately after the description of the dangerous goods; (b)on a small means of containment, next to the shipping name of the dangerous goods; and (c)on a large means of containment, next to the placard for the primary class of the dangerous goods or the placard for the subsidiary class, if any. For example, the notation on a shipping document would be "UN1935, CYANIDE SOLUTION, N.O.S, Class 6.1, PG I, toxic by inhalation". (2) This special provision does not apply to a person who transports these dangerous goods in accordance with an exemption set out in sections 1.15, 1.17 or 1.17.1 of Part 1 (Coming Into Force, Repeal, Interpretation, General Provisions and Special Cases). (3) A consignor of UN1005, ANHYDROUS AMMONIA, must include the words "inhalation hazard" or "dangereux par inhalation": (a)on a shipping document, immediately after the shipping name of the dangerous goods; and (b)on a small means of containment, next to the shipping name of the dangerous goods. When UN1005, ANHYDROUS AMMONIA, is contained in a large means of containment on which is affixed the anhydrous ammonia placard, the words "Anhydrous Ammonia, Inhalation Hazard" or "Ammoniac anhydre, dangereux par inhalation" must be displayed next to the placard in accordance with paragraph 4.18.2(b). SOR/2014-306,38 - A person must not handle, offer for transport or transport these dangerous goods in a large means of containment if they are in direct contact with the large means of

containment. SOR/2014-306

**ERAP Index** 25 Explosive Limit and Limited Quantity Index : 0

Passenger Carrying Road Vehicle or Passenger : Forbidden

Carrying Railway Vehicle Index

Passenger Carrying Ship Index : Forbidden

# Transport by sea

Transport document description (IMDG) : UN UN1045 FLUORINE, COMPRESSED, 2 (5.1)

UN-No. (IMDG) : UN1045

Proper Shipping Name (IMDG) : FLUORINE, COMPRESSED

Class (IMDG) : 2 - Gases

Subsidiary risks (IMDG) : 5.1 - Oxidizing substances

Limited quantities (IMDG)

# Air transport

Forbidden

### **SECTION 15: Regulatory information**

# 15.1. US Federal regulations

Fluorine (7782-41-4)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory Subject to reporting requirements of United States SARA Section 313	
CERCLA RQ	10 lb
Section 302 EPCRA Reportable Quantity (RQ)	10 lb
SARA Section 302 Threshold Planning Quantity (TPQ)	500 lb

#### 15.2. International regulations

#### CANADA

Fluorine (7782-41-4)	
Listed on the Canadian DSL (Domestic Substances List)	

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#### **EU-Regulations**

#### Fluorine (7782-41-4)

Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

### **National regulations**

### Fluorine (7782-41-4)

Listed on the AICS (Australian Inventory of Chemical Substances)

Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)

Listed on the Korean ECL (Existing Chemicals List)

Listed on NZIoC (New Zealand Inventory of Chemicals)

Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)

Listed on INSQ (Mexican National Inventory of Chemical Substances)

Listed on CICR (Turkish Inventory and Control of Chemicals)

Listed on the TCSI (Taiwan Chemical Substance Inventory)

#### 15.3. US State regulations

Fluorine (7782-41-4)	
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

# **SECTION 16: Other information**

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Revision date : 11/21/2018

Other information : This Safety Data Sheet is offered pursuant to OSHA's Hazard Communication Standard, 29

CFR, 1910.1200. Other government regulations must be reviewed for applicability to this

product.

### Full text of H-phrases:

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	H270	May cause or intensify fire; oxidizer	
	H280	Contains gas under pressure; may explode if heated	
	H314	Causes severe skin burns and eye damage	
	H318	Causes serious eye damage	
	H330	Fatal if inhaled	
	H335	May cause respiratory irritation	

### SDS US (GHS HazCom 2012)

This Safety Data Sheet is offered pursuant to OSHA's Hazard Communication Standard, 29 CFR, 1910.1200. Other government regulations must be reviewed for applicability to this product. To the best of Air Liquide USA LLC and its affiliates' 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 product 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.

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