

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product form	: Substance
Substance name	: Octafluorocyclobutane (RC318)
CAS No	: 115-25-3
Product code	: SG-1001-02736
Formula	: C ₄ F ₈
Synonyms	: Cyclobutane, octafluoro- / FC-C 318 / Freon C-318 / Perfluorocyclobutane / Propellant C318 / R-C 318 / Cyclobutane, 1,1,2,2,3,3,4,4-octafluoro- / RC318 / RC-318 / Refrigerant gas R C318 / PFC-318 / PFC C-318

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

Use of the substance/mixture	: Test gas/Calibration gas.
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1.3. Details of the supplier of the safety data sheet

Air Liquide
2700 Post Oak Boulevard
Houston, TX 77056 - USA
T 1-800-819-1704
www.us.airliquide.com

1.4. Emergency telephone number

Emergency number	: CHEMTREC: 1-800-424-9300
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SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

GHS-US classification

Liquefied gas	H280
Full text of H-phrases: see section 16	

2.2. Label elements

GHS-US labeling

Hazard pictograms (GHS-US)



GHS04

Signal word (GHS-US)	: Warning
Hazard statements (GHS-US)	: H280 - Contains gas under pressure; may explode if heated OSHA-H01 - May displace oxygen and cause rapid suffocation CGA-HG01 - May cause frostbite
Precautionary statements (GHS-US)	: P202 - Do not handle until all safety precautions have been read and understood P271 - Use only outdoors or in a well-ventilated area P280 - Wear eye protection, face protection, protective gloves, protective clothing P302 - IF ON SKIN: Thaw frosted parts with lukewarm water. Do not rub affected area, Get immediate medical advice/attention P304+P340 - If inhaled: Remove person to fresh air and keep comfortable for breathing P305+P351+P338 - If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing P308+P313 - If exposed or concerned: Get medical advice/attention P402 - Store in a dry place P501 - Dispose of contents/container in accordance with local/regional/national/international regulations 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-PG21 - Open valve slowly

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2.3. Other hazards

No additional information available

2.4. Unknown acute toxicity (GHS US)

Not applicable

SECTION 3: Composition/information on ingredients

3.1. Substance

Name : Octafluorocyclobutane (RC318)
CAS No : 115-25-3

Name	Product identifier	%	GHS-US classification
Octafluorocyclobutane (RC318)	(CAS No) 115-25-3	> 99	Liquefied gas, H280 Aquatic Chronic 2, H411

Full text of H-phrases: see section 16

3.2. Mixture

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. If you feel unwell, seek medical advice.

First-aid measures after skin contact : Thaw frosted parts with lukewarm water. Do not rub affected area. Get immediate medical advice/attention.

First-aid measures after eye contact : Immediately flush eyes thoroughly with water for at least 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, both acute and delayed

Symptoms/injuries after inhalation : May displace oxygen and cause rapid suffocation.

Symptoms/injuries after skin contact : May cause frostbite.

Symptoms/injuries after eye contact : Contact with the product may cause cold burns or frostbite.

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

Symptoms/injuries upon intravenous administration : Not known.

Chronic symptoms : Adverse effects not expected from this product.

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

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

SECTION 5: Firefighting measures

5.1. Extinguishing media

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

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

5.2. Special hazards arising from the substance or mixture

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 : None known.

5.3. Advice for firefighters

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.

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6.1.1. For non-emergency personnel

- Protective equipment : Wear protective equipment consistent with the site emergency plan.
- Emergency procedures : Escape the danger area by the closest safe route. 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 safe to do so.

6.3. Methods and material for containment and cleaning up

- For containment : Try to stop release if safe to do so.
- Methods for cleaning up : Dispose of this material and its container in accordance with local regulations.

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 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.

7.2. 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 cylinder from physical damage. Store in well ventilated area.
- Incompatible products : None known.
- Incompatible materials : None known.

7.3. Specific end use(s)

None.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Octafluorocyclobutane (RC318) (115-25-3)	
ACGIH	Not applicable
OSHA	Not applicable
Octafluorocyclobutane (RC318) (115-25-3)	
ACGIH	Not applicable
OSHA	Not applicable

8.2. Exposure controls

- Appropriate engineering controls : Ensure exposure is below occupational exposure limits. Provide adequate general and local exhaust ventilation. Systems under pressure should be regularly checked for leakages. Oxygen detectors should be used when asphyxiating gases may be released. Consider work permit system e.g. for maintenance activities.
- Hand protection : Wear working gloves when handling gas containers. 29 CFR 1910.138: Hand Protection.
- Eye protection : Wear safety glasses with side shields. 29 CFR 1910.133: Eye and Face Protection.
- Skin and body protection : Wear suitable protective clothing, e.g. - lab coats, coveralls or flame resistant clothing.
- Respiratory protection : None necessary during normal and routine operations. See Sections 5 & 6.
- Thermal hazard protection : None necessary during normal and routine operations.
- Environmental exposure controls : Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment.

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Other information : Wear safety shoes while handling containers. Standard EN ISO 20345 - Personal protective equipment - Safety footwear.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	: Gas
Appearance	: Clear, colorless gas.
Color	: Colourless.
Odor	: Ethereal.
Odor threshold	: No data available
pH	: Not applicable.
Melting point	: -40.2 °C
Freezing point	: -40.2 °C
Boiling point	: -4.9500000000 °C
Critical temperature	: 116.35 °C
Critical pressure	: 2784 kPa
Flash point	: Not applicable for gases and gas-mixtures.
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
Explosion limits	: Non flammable.
Explosive properties	: Not applicable.
Oxidizing properties	: None.
Vapor pressure	: 270 kPa
Relative density	: 1.6
Relative vapor density at 20 °C	: 7.03
Molecular mass	: 200.04 g/mol
Relative gas density	: 6.9
Solubility	: Water: Insoluble
Log Pow	: Not known.
Log Kow	: No data available
Auto-ignition temperature	: Not applicable.
Decomposition temperature	: No data available
Viscosity	: No data available
Viscosity, kinematic	: Not applicable.
Viscosity, dynamic	: Not applicable.

9.2. Other information

Gas group	: Liquefied gas
Additional information	: Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

SECTION 10: Stability and reactivity

10.1. Reactivity

None known.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

None known.

10.4. Conditions to avoid

None under recommended storage and handling conditions (see section 7).

10.5. Incompatible materials

None known.

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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 : Not classified

Octafluorocyclobutane (RC318) (115-25-3)	
LC50 inhalation rat (ppm)	820000 ppm/4h
ATE US (gases)	820000.000 ppmV/4h

Octafluorocyclobutane (RC318) (115-25-3)	
LC50 inhalation rat (ppm)	820000 ppm/4h
ATE US (gases)	820000.000 ppmV/4h

Skin corrosion/irritation : Not classified
pH: Not applicable.

Serious eye damage/irritation : Not classified
pH: Not applicable.

Respiratory or skin sensitization : Not classified

Germ cell mutagenicity : Not classified

Carcinogenicity : Not classified

Reproductive toxicity : Not classified

Specific target organ toxicity (single exposure) : Not classified

Specific target organ toxicity (repeated exposure) : Not classified

Aspiration hazard : Not classified

Symptoms/injuries after inhalation : May displace oxygen and cause rapid suffocation.

Symptoms/injuries after skin contact : May cause frostbite.

Symptoms/injuries after eye contact : Contact with the product may cause cold burns or frostbite.

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

Symptoms/injuries upon intravenous administration : Not known.

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

Octafluorocyclobutane (RC318) (115-25-3)	
Persistence and degradability	No data available.

Octafluorocyclobutane (RC318) (115-25-3)	
Persistence and degradability	No data available.

12.3. Bioaccumulative potential

Octafluorocyclobutane (RC318) (115-25-3)	
Log Pow	Not known.
Bioaccumulative potential	No data available.

Octafluorocyclobutane (RC318) (115-25-3)	
Log Pow	Not known.
Bioaccumulative potential	No data available.

12.4. Mobility in soil

Octafluorocyclobutane (RC318) (115-25-3)	
Ecology - soil	Because of its high volatility, the product is unlikely to cause ground or water pollution.

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Octafluorocyclobutane (RC318) (115-25-3)

Ecology - soil

Because of its high volatility, the product is unlikely to cause ground or water pollution.

12.5. Other adverse effects

- Effect on ozone layer : None.
- Global warming potential [CO₂=1] : 10300
- Effect on the global warming : 10300
- Contains Fluorinated greenhouse gases covered by the Kyoto protocol.

SECTION 13: Disposal considerations

13.1. Waste treatment 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.
- Waste disposal recommendations : Refer to the CGA Pamphlet P-63 "Disposal of Gases" available at www.cganet.com for more guidance on suitable disposal methods.

SECTION 14: Transport information

Department of Transportation (DOT)

In accordance with DOT

- Transport document description : UN1976 Octafluorocyclobutane, 2.2
- UN-No.(DOT) : UN1976
- Proper Shipping Name (DOT) : Octafluorocyclobutane
- Transport hazard class(es) (DOT) : 2.2 - Class 2.2 - Non-flammable compressed gas 49 CFR 173.115
- Hazard labels (DOT) : 2.2 - Non-flammable gas



- DOT Packaging Non Bulk (49 CFR 173.xxx) : 304
- DOT Packaging Bulk (49 CFR 173.xxx) : 314;315
- DOT Special Provisions (49 CFR 172.102) : 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.
- DOT Packaging Exceptions (49 CFR 173.xxx) : None
- DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27) : 75 kg
- DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75) : 150 kg
- DOT Vessel Stowage Location : A - The material may be stowed "on deck" or "under deck" on a cargo vessel and on a passenger vessel.

Additional information

- Emergency Response Guide (ERG) Number : 126
- 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.

ADR

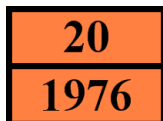
- Transport document description : UN 1976, 2, (C/E)
- Class (ADR) : 2 - Gases

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Hazard identification number (Kemler No.) : 20
Classification code (ADR) : 2A
Orange plates :



Tunnel restriction code (ADR) : C/E
Limited quantities (ADR) : 120ml
Excepted quantities (ADR) : E1

Transport by sea

UN-No. (IMDG) : 1976
Proper Shipping Name (IMDG) : OCTAFLUOROCYCLOBUTANE
Class (IMDG) : 2 - Gases
MFAG-No : 126

Air transport

UN-No. (IATA) : 1976
Proper Shipping Name (IATA) : OCTAFLUOROCYCLOBUTANE
Class (IATA) : 2
Civil Aeronautics Law : Gases under pressure/Gases nonflammable nontoxic under pressure

SECTION 15: Regulatory information

15.1. US Federal regulations

Octafluorocyclobutane (RC318) (115-25-3)

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

Octafluorocyclobutane (RC318) (115-25-3)

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

15.2. International regulations

CANADA

Octafluorocyclobutane (RC318) (115-25-3)

Listed on the Canadian DSL (Domestic Substances List)

WHMIS Classification : Class A - Compressed Gas

Octafluorocyclobutane (RC318) (115-25-3)

Listed on the Canadian DSL (Domestic Substances List)

WHMIS Classification : Class A - Compressed Gas

EU-Regulations

Octafluorocyclobutane (RC318) (115-25-3)

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

Octafluorocyclobutane (RC318) (115-25-3)

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

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Liquefied gas : H280
Full text of H-phrases: see section 16

Classification according to Directive 67/548/EEC [DSD] or 1999/45/EC [DPD]

Not classified

National regulations

Octafluorocyclobutane (RC318) (115-25-3)

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 Japanese ENCS (Existing & New Chemical Substances) inventory
Listed on the Korean ECL (Existing Chemicals List)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)

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Octafluorocyclobutane (RC318) (115-25-3)

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 Japanese ENCS (Existing & New Chemical Substances) inventory
Listed on the Korean ECL (Existing Chemicals List)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)

15.3. US State regulations

Octafluorocyclobutane (RC318)(115-25-3)

State or local regulations	U.S. - New Jersey - Right to Know Hazardous Substance List
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Octafluorocyclobutane (RC318) (115-25-3)

U.S. - New Jersey - Right to Know Hazardous Substance List

SECTION 16: Other information

Indication of changes : Revised safety data sheet in accordance with OSHA final rule on GHS implementation promulgated March 26, 2012.

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:

Aquatic Chronic 2	Hazardous to the aquatic environment - Chronic Hazard Category 2
Liquefied gas	Gases under pressure Liquefied gas
H280	Contains gas under pressure; may explode if heated
H411	Toxic to aquatic life with long lasting effects

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 America Corporation'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 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.