

# SAFETY DATA SHEET

Flammable Liquefied Gas Mixture: 1,1,1,2-Tetrafluoropropane \ 1,1,1,2,2-Pentafluoropropane \ 2-Chloro-3,3,3-Trifluoropropene \ 2,3,3,3-Tetrafluoropropene \ 3,3,3-Trifluoropropene \ 3,3,3-Trifluoropropyne \ Cis-1-Chloro-2-Fluoro-Ethylene \ Methyl Chloride \ R12-Dichlorodifluoromethane \ R124-Chlorotetrafluoroethane \ R134A-Tetrafluoroethane \ R218-Octafluoropropane \ R244Bb-Chlorotetrafluoropropane \ R244Cc-Chlorotetrafluoropropane \ Trans-1-Chloro-2-Fluoroethylene \ Trans-1,3,3,3-Tetrafluoropropene \ Vinyl Chloride

## Section 1. Identification

- GHS product identifier** : Flammable Liquefied Gas Mixture: 1,1,1,2-Tetrafluoropropane \ 1,1,1,2,2-Pentafluoropropane \ 2-Chloro-3,3,3-Trifluoropropene \ 2,3,3,3-Tetrafluoropropene \ 3,3,3-Trifluoropropene \ 3,3,3-Trifluoropropyne \ Cis-1-Chloro-2-Fluoro-Ethylene \ Methyl Chloride \ R12-Dichlorodifluoromethane \ R124-Chlorotetrafluoroethane \ R134A-Tetrafluoroethane \ R218-Octafluoropropane \ R244Bb-Chlorotetrafluoropropane \ R244Cc-Chlorotetrafluoropropane \ Trans-1-Chloro-2-Fluoroethylene \ Trans-1,3,3,3-Tetrafluoropropene \ Vinyl Chloride
- Other means of identification** : Not available.
- Product type** : Liquefied gas
- Product use** : Synthetic/Analytical chemistry.
- SDS #** : 022757
- Supplier's details** : Airgas USA, LLC and its affiliates  
259 North Radnor-Chester Road  
Suite 100  
Radnor, PA 19087-5283  
1-610-687-5253
- 24-hour telephone** : 1-866-734-3438

## Section 2. Hazards identification

- OSHA/HCS status** : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
- Classification of the substance or mixture** : FLAMMABLE GASES - Category 1  
GASES UNDER PRESSURE - Liquefied gas

### GHS label elements

**Hazard pictograms** :



- Signal word** : Danger
- Hazard statements** : Extremely flammable gas.  
May form explosive mixtures with air.  
Contains gas under pressure; may explode if heated.  
May cause frostbite.  
May displace oxygen and cause rapid suffocation.

### Precautionary statements

**General**

- : Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction. Always keep container in upright position. Approach suspected leak area with caution.

Flammable Liquefied Gas Mixture: 1,1,1,2-Tetrafluoropropane \ 1,1,1,2,2-Pentafluoropropane \ 2-Chloro-3,3,3-Trifluoropropene \ 2,3,3,3-Tetrafluoropropene \ 3,3,3-Trifluoropropene \ 3,3,3-Trifluoropropyne \ Cis-1-Chloro-2-Fluoro-Ethylene \ Methyl Chloride \ R12-Dichlorodifluoromethane \ R124-Chlorotetrafluoroethane \ R134A-Tetrafluoroethane \ R218-Octafluoropropane \ R244Bb-Chlorotetrafluoropropane \ R244Cc-Chlorotetrafluoropropane \ Trans-1-Chloro-2-Fluoroethylene \ Trans-1,3,3,3-Tetrafluoropropene \ Vinyl Chloride

## Section 2. Hazards identification

<b>Prevention</b>	: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
<b>Response</b>	: Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.
<b>Storage</b>	: Protect from sunlight. Store in a well-ventilated place.
<b>Disposal</b>	: Not applicable.
<b>Hazards not otherwise classified</b>	: Liquid can cause burns similar to frostbite.

## Section 3. Composition/information on ingredients

<b>Substance/mixture</b>	: Mixture
<b>Other means of identification</b>	: Not available.
<b>Product code</b>	: 022757

Ingredient name	%	CAS number
2,3,3,3 - Tetrafluoropropene (R1234yf)	99.842 - 99.998	754-12-1
Methyl Chloride	0.0001 - 0.0099	74-87-3
3,3,3-trifluoropropene	0.0001 - 0.0099	677-21-4
Methane, dichlorodifluoro-	0.0001 - 0.0099	75-71-8
1-Chloro-1,2,2,2-Tetrafluoroethane	0.0001 - 0.0099	2837-89-0
1,1,1,2 - tetrafluoroethane	0.0001 - 0.0099	811-97-2
Perfluoropropane	0.0001 - 0.0099	76-19-7
HFO-1234ZE	0.0001 - 0.0099	29118-24-9
vinyl chloride	0.0001 - 0.0099	75-01-4
2-Chloro-3,3,3-trifluoropropene	0.0001 - 0.0099	2730-62-3
3,3,3-trifluoropropyne	0.0001 - 0.0099	661-54-1
1-chloro-1,1,2,2-tetrafluoropropane	0.0001 - 0.0099	421-75-0
1,1,1,2,2-Pentafluoropropane	0.0001 - 0.0099	1814-88-6
Trans-1-Chloro-2-fluoroethylene	0.0001 - 0.0099	2268-32-8
(Z)-1-Chloro-2-fluoroethylene	0.0001 - 0.0099	2268-31-7
1,1,1,2-Tetrafluoropropane	0.0001 - 0.0099	421-48-7
Propane, 2-chloro-1,1,1,2-tetrafluoro-	0.0001 - 0.0099	421-73-8

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

**There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.**

Occupational exposure limits, if available, are listed in Section 8.

## Section 4. First aid measures

### Description of necessary first aid measures

<b>Eye contact</b>	: Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention if irritation occurs.
<b>Inhalation</b>	: Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Flammable Liquefied Gas Mixture: 1,1,1,2-Tetrafluoropropane \ 1,1,1,2,2-Pentafluoropropane \ 2-Chloro-3,3,3-Trifluoropropene \ 2,3,3,3-Tetrafluoropropene \ 3,3,3-Trifluoropropene \ 3,3,3-Trifluoropropyne \ Cis-1-Chloro-2-Fluoro-Ethylene \ Methyl Chloride \ R12-Dichlorodifluoromethane \ R124-Chlorotetrafluoroethane \ R134A-Tetrafluoroethane \ R218-Octafluoropropane \ R244Bb-Chlorotetrafluoropropane \ R244Cc-Chlorotetrafluoropropane \ Trans-1-Chloro-2-Fluoroethylene \ Trans-1,3,3,3-Tetrafluoropropene \ Vinyl Chloride

## Section 4. First aid measures

- Skin contact** : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Get medical attention if symptoms occur. In case of contact with liquid, warm frozen tissues slowly with lukewarm water and get medical attention. Do not rub affected area. Wash clothing before reuse. Clean shoes thoroughly before reuse.
- Ingestion** : Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical attention if adverse health effects persist or are severe. Ingestion of liquid can cause burns similar to frostbite. If frostbite occurs, get medical attention. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. As this product rapidly becomes a gas when released, refer to the inhalation section.

### Most important symptoms/effects, acute and delayed

#### Potential acute health effects

- Eye contact** : Liquid can cause burns similar to frostbite.
- Inhalation** : No known significant effects or critical hazards.
- Skin contact** : Dermal contact with rapidly evaporating liquid could result in freezing of the tissues or frostbite.
- Frostbite** : Try to warm up the frozen tissues and seek medical attention.
- Ingestion** : Ingestion of liquid can cause burns similar to frostbite.

#### Over-exposure signs/symptoms

- Eye contact** : Adverse symptoms may include the following:, frostbite
- Inhalation** : No specific data.
- Skin contact** : Adverse symptoms may include the following:, frostbite
- Ingestion** : Adverse symptoms may include the following:, frostbite

### Indication of immediate medical attention and special treatment needed, if necessary

- Notes to physician** : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
- Specific treatments** : No specific treatment.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

## Section 5. Fire-fighting measures

### Extinguishing media

- Suitable extinguishing media** : Use an extinguishing agent suitable for the surrounding fire.
- Unsuitable extinguishing media** : None known.

**Specific hazards arising from the chemical** : Contains gas under pressure. Extremely flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion.

- Hazardous thermal decomposition products** : Decomposition products may include the following materials:  
carbon dioxide  
carbon monoxide  
halogenated compounds

Flammable Liquefied Gas Mixture: 1,1,1,2-Tetrafluoropropane \ 1,1,1,2,2-Pentafluoropropane \ 2-Chloro-3,3,3-Trifluoropropene \ 2,3,3,3-Tetrafluoropropene \ 3,3,3-Trifluoropropene \ 3,3,3-Trifluoropropyne \ Cis-1-Chloro-2-Fluoro-Ethylene \ Methyl Chloride \ R12-Dichlorodifluoromethane \ R124-Chlorotetrafluoroethane \ R134A-Tetrafluoroethane \ R218-Octafluoropropane \ R244Bb-Chlorotetrafluoropropane \ R244Cc-Chlorotetrafluoropropane \ Trans-1-Chloro-2-Fluoroethylene \ Trans-1,3,3,3-Tetrafluoropropene \ Vinyl Chloride

## Section 5. Fire-fighting measures

- Special protective actions for fire-fighters** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. If involved in fire, shut off flow immediately if it can be done without risk. If this is impossible, withdraw from area and allow fire to burn. Fight fire from protected location or maximum possible distance. Eliminate all ignition sources if safe to do so.
- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. For incidents involving large quantities, thermally insulated undergarments and thick textile or leather gloves should be worn.

## Section 6. Accidental release measures

### Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : Accidental releases pose a serious fire or explosion hazard. No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
- For emergency responders** : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".
- Environmental precautions** : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

### Methods and materials for containment and cleaning up

- Small spill** : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment.
- Large spill** : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

## Section 7. Handling and storage

### Precautions for safe handling

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Do not get in eyes or on skin or clothing. Avoid breathing gas. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement. Use only non-sparking tools. Empty containers retain product residue and can be hazardous. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment.
- Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Flammable Liquefied Gas Mixture: 1,1,1,2-Tetrafluoropropane \ 1,1,1,2,2-Pentafluoropropane \ 2-Chloro-3,3,3-Trifluoropropene \ 2,3,3,3-Tetrafluoropropane \ 3,3,3-Trifluoropropane \ 3,3,3-Trifluoropropyne \ Cis-1-Chloro-2-Fluoro-Ethylene \ Methyl Chloride \ R12-Dichlorodifluoromethane \ R124-Chlorotetrafluoroethane \ R134A-Tetrafluoroethane \ R218-Octafluoropropane \ R244Bb-Chlorotetrafluoropropane \ R244Cc-Chlorotetrafluoropropane \ Trans-1-Chloro-2-Fluoroethylene \ Trans-1,3,3,3-Tetrafluoropropane \ Vinyl Chloride

## Section 7. Handling and storage

**Conditions for safe storage, including any incompatibilities** : Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Eliminate all ignition sources. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F). Keep container tightly closed and sealed until ready for use. See Section 10 for incompatible materials before handling or use.

## Section 8. Exposure controls/personal protection

### Control parameters

#### Occupational exposure limits

Ingredient name	Exposure limits
2,3,3,3 - Tetrafluoropropane (R1234yf)	<p><b>AIHA WEEL (United States, 10/2011).</b> TWA: 500 ppm 8 hours.</p> <p><b>OSHA PEL Z2 (United States, 2/2013).</b> TWA: 2.5 mg/m<sup>3</sup> 8 hours. Form: Dust</p> <p><b>ACGIH TLV (United States, 3/2017).</b> TWA: 2.5 mg/m<sup>3</sup>, (as F) 8 hours.</p> <p><b>OSHA PEL 1989 (United States, 3/1989).</b> TWA: 2.5 mg/m<sup>3</sup>, (as F) 8 hours.</p> <p><b>OSHA PEL (United States, 6/2016).</b> TWA: 2.5 mg/m<sup>3</sup>, (as F) 8 hours.</p> <p><b>ACGIH TLV (United States, 3/2017).</b> <b>Absorbed through skin.</b> TWA: 50 ppm 8 hours. TWA: 103 mg/m<sup>3</sup> 8 hours. STEL: 100 ppm 15 minutes. STEL: 207 mg/m<sup>3</sup> 15 minutes.</p> <p><b>OSHA PEL 1989 (United States, 3/1989).</b> TWA: 50 ppm 8 hours. TWA: 105 mg/m<sup>3</sup> 8 hours. STEL: 100 ppm 15 minutes. STEL: 210 mg/m<sup>3</sup> 15 minutes.</p> <p><b>OSHA PEL Z2 (United States, 2/2013).</b> TWA: 100 ppm 8 hours. CEIL: 200 ppm AMP: 300 ppm 5 minutes.</p>
Methyl Chloride	<p><b>ACGIH TLV (United States, 3/2017).</b> TWA: 2.5 mg/m<sup>3</sup>, (as F) 8 hours.</p> <p><b>OSHA PEL 1989 (United States, 3/1989).</b> TWA: 2.5 mg/m<sup>3</sup>, (as F) 8 hours.</p> <p><b>OSHA PEL Z2 (United States, 2/2013).</b> TWA: 2.5 mg/m<sup>3</sup> 8 hours. Form: Dust</p> <p><b>OSHA PEL (United States, 6/2016).</b> TWA: 2.5 mg/m<sup>3</sup>, (as F) 8 hours.</p> <p><b>ACGIH TLV (United States, 3/2017).</b> TWA: 4950 mg/m<sup>3</sup> 8 hours. TWA: 1000 ppm 8 hours.</p> <p><b>NIOSH REL (United States, 10/2016).</b> TWA: 4950 mg/m<sup>3</sup> 10 hours. TWA: 1000 ppm 10 hours.</p> <p><b>OSHA PEL (United States, 6/2016).</b> TWA: 4950 mg/m<sup>3</sup> 8 hours. TWA: 1000 ppm 8 hours.</p> <p><b>OSHA PEL 1989 (United States, 3/1989).</b> TWA: 4950 mg/m<sup>3</sup> 8 hours. TWA: 1000 ppm 8 hours.</p>
3,3,3-trifluoropropene	<p><b>ACGIH TLV (United States, 3/2017).</b> TWA: 2.5 mg/m<sup>3</sup>, (as F) 8 hours.</p> <p><b>OSHA PEL 1989 (United States, 3/1989).</b> TWA: 2.5 mg/m<sup>3</sup>, (as F) 8 hours.</p> <p><b>OSHA PEL Z2 (United States, 2/2013).</b> TWA: 2.5 mg/m<sup>3</sup> 8 hours. Form: Dust</p> <p><b>OSHA PEL (United States, 6/2016).</b> TWA: 2.5 mg/m<sup>3</sup>, (as F) 8 hours.</p> <p><b>ACGIH TLV (United States, 3/2017).</b> TWA: 4950 mg/m<sup>3</sup> 8 hours. TWA: 1000 ppm 8 hours.</p> <p><b>NIOSH REL (United States, 10/2016).</b> TWA: 4950 mg/m<sup>3</sup> 10 hours. TWA: 1000 ppm 10 hours.</p> <p><b>OSHA PEL (United States, 6/2016).</b> TWA: 4950 mg/m<sup>3</sup> 8 hours. TWA: 1000 ppm 8 hours.</p> <p><b>OSHA PEL 1989 (United States, 3/1989).</b> TWA: 4950 mg/m<sup>3</sup> 8 hours. TWA: 1000 ppm 8 hours.</p>
Methane, dichlorodifluoro-	<p><b>ACGIH TLV (United States, 3/2017).</b> TWA: 2.5 mg/m<sup>3</sup>, (as F) 8 hours.</p> <p><b>OSHA PEL 1989 (United States, 3/1989).</b> TWA: 2.5 mg/m<sup>3</sup>, (as F) 8 hours.</p> <p><b>OSHA PEL Z2 (United States, 2/2013).</b> TWA: 2.5 mg/m<sup>3</sup> 8 hours. Form: Dust</p> <p><b>OSHA PEL (United States, 6/2016).</b> TWA: 2.5 mg/m<sup>3</sup>, (as F) 8 hours.</p> <p><b>ACGIH TLV (United States, 3/2017).</b> TWA: 4950 mg/m<sup>3</sup> 8 hours. TWA: 1000 ppm 8 hours.</p> <p><b>NIOSH REL (United States, 10/2016).</b> TWA: 4950 mg/m<sup>3</sup> 10 hours. TWA: 1000 ppm 10 hours.</p> <p><b>OSHA PEL (United States, 6/2016).</b> TWA: 4950 mg/m<sup>3</sup> 8 hours. TWA: 1000 ppm 8 hours.</p> <p><b>OSHA PEL 1989 (United States, 3/1989).</b> TWA: 4950 mg/m<sup>3</sup> 8 hours. TWA: 1000 ppm 8 hours.</p>

## Section 8. Exposure controls/personal protection

1-Chloro-1,2,2,2-Tetrafluoroethane

1,1,1,2 - tetrafluoroethane

Perfluoropropane

HFO-1234ZE

vinyl chloride

2-Chloro-3,3,3-trifluoropropene  
3,3,3-trifluoropropyne

1-chloro-1,1,2,2-tetrafluoropropane  
1,1,1,2,2-Pentafluoropropane

Trans-1-Chloro-2-fluoroethylene  
(Z)-1-Chloro-2-fluoroethylene  
1,1,1,2-Tetrafluoropropane  
Propane, 2-chloro-1,1,1,2-tetrafluoro-

**AIHA WEEL (United States, 10/2011).**

TWA: 1000 ppm 8 hours.

**OSHA PEL Z2 (United States, 2/2013).**

TWA: 2.5 mg/m<sup>3</sup> 8 hours. Form: Dust

**AIHA WEEL (United States, 10/2011).**

TWA: 1000 ppm 8 hours.

**ACGIH TLV (United States, 3/2017).**

TWA: 2.5 mg/m<sup>3</sup>, (as F) 8 hours.

**OSHA PEL 1989 (United States, 3/1989).**

TWA: 2.5 mg/m<sup>3</sup>, (as F) 8 hours.

**OSHA PEL (United States, 6/2016).**

TWA: 2.5 mg/m<sup>3</sup>, (as F) 8 hours.

**OSHA PEL Z2 (United States, 2/2013).**

TWA: 2.5 mg/m<sup>3</sup> 8 hours. Form: Dust

**ACGIH TLV (United States, 3/2017).**

TWA: 2.5 mg/m<sup>3</sup>, (as F) 8 hours.

**OSHA PEL 1989 (United States, 3/1989).**

TWA: 2.5 mg/m<sup>3</sup>, (as F) 8 hours.

**OSHA PEL (United States, 6/2016).**

TWA: 2.5 mg/m<sup>3</sup>, (as F) 8 hours.

**OSHA PEL Z2 (United States, 2/2013).**

TWA: 2.5 mg/m<sup>3</sup> 8 hours. Form: Dust

**ACGIH TLV (United States, 3/2017).**

TWA: 2.5 mg/m<sup>3</sup>, (as F) 8 hours.

**OSHA PEL 1989 (United States, 3/1989).**

TWA: 2.5 mg/m<sup>3</sup>, (as F) 8 hours.

**OSHA PEL (United States, 6/2016).**

TWA: 2.5 mg/m<sup>3</sup>, (as F) 8 hours.

**ACGIH TLV (United States, 3/2017).**

TWA: 1 ppm 8 hours.

**OSHA PEL (United States, 6/2016).**

STEL: 5 ppm 15 minutes.

TWA: 1 ppm 8 hours.

**OSHA PEL 1989 (United States, 3/1989).**

STEL: 5 ppm 15 minutes.

TWA: 1 ppm 8 hours.

None.

**ACGIH TLV (United States, 3/2017).**

TWA: 2.5 mg/m<sup>3</sup>, (as F) 8 hours.

**OSHA PEL 1989 (United States, 3/1989).**

TWA: 2.5 mg/m<sup>3</sup>, (as F) 8 hours.

**OSHA PEL Z2 (United States, 2/2013).**

TWA: 2.5 mg/m<sup>3</sup> 8 hours. Form: Dust

**OSHA PEL (United States, 6/2016).**

TWA: 2.5 mg/m<sup>3</sup>, (as F) 8 hours.

None.

**ACGIH TLV (United States, 3/2017).**

TWA: 2.5 mg/m<sup>3</sup>, (as F) 8 hours.

**OSHA PEL 1989 (United States, 3/1989).**

TWA: 2.5 mg/m<sup>3</sup>, (as F) 8 hours.

**OSHA PEL Z2 (United States, 2/2013).**

TWA: 2.5 mg/m<sup>3</sup> 8 hours. Form: Dust

**OSHA PEL (United States, 6/2016).**

TWA: 2.5 mg/m<sup>3</sup>, (as F) 8 hours.

None.

None.

None.

None.

Flammable Liquefied Gas Mixture: 1,1,1,2-Tetrafluoropropane \ 1,1,1,2,2-Pentafluoropropane \ 2-Chloro-3,3,3-Trifluoropropene \ 2,3,3,3-Tetrafluoropropene \ 3,3,3-Trifluoropropene \ 3,3,3-Trifluoropropyne \ Cis-1-Chloro-2-Fluoro-Ethylene \ Methyl Chloride \ R12-Dichlorodifluoromethane \ R124-Chlorotetrafluoroethane \ R134A-Tetrafluoroethane \ R218-Octafluoropropane \ R244Bb-Chlorotetrafluoropropane \ R244Cc-Chlorotetrafluoropropane \ Trans-1-Chloro-2-Fluoroethylene \ Trans-1,3,3,3-Tetrafluoropropene \ Vinyl Chloride

## Section 8. Exposure controls/personal protection

- Appropriate engineering controls** : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.
- Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.
- Individual protection measures**
- Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.
- Eye/face protection** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.
- Skin protection**
- Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. If contact with the liquid is possible, insulated gloves suitable for low temperatures should be worn. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.
- Body protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.
- Other skin protection** : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory protection** : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.
- Thermal hazards** : If there is a risk of contact with the liquid, all protective equipment worn should be suitable for use with extremely low temperature materials.

## Section 9. Physical and chemical properties

### Appearance

- Physical state** : Gas. [Liquefied gas]
- Color** : Not available.
- Odor** : Not available.
- Odor threshold** : Not available.
- pH** : Not available.
- Melting point** : Not available.
- Boiling point** : Not available.
- Critical temperature** : Not available.

Flammable Liquefied Gas Mixture: 1,1,1,2-Tetrafluoropropane \ 1,1,1,2,2-Pentafluoropropane \ 2-Chloro-3,3,3-Trifluoropropene \ 2,3,3,3-Tetrafluoropropene \ 3,3,3-Trifluoropropene \ 3,3,3-Trifluoropropyne \ Cis-1-Chloro-2-Fluoro-Ethylene \ Methyl Chloride \ R12-Dichlorodifluoromethane \ R124-Chlorotetrafluoroethane \ R134A-Tetrafluoroethane \ R218-Octafluoropropane \ R244Bb-Chlorotetrafluoropropane \ R244Cc-Chlorotetrafluoropropane \ Trans-1-Chloro-2-Fluoroethylene \ Trans-1,3,3,3-Tetrafluoropropane \ Vinyl Chloride

## Section 9. Physical and chemical properties

Flash point	: Closed cup: -22°C (-7.6°F)
Evaporation rate	: Not available.
Flammability (solid, gas)	: Not available.
Lower and upper explosive (flammable) limits	: Not available.
Vapor pressure	: Not available.
Vapor density	: Not available.
Gas Density (lb/ft <sup>3</sup> )	: Only known value: 1.1 (1-Propene, 2,3,3,3-tetrafluoro-).
Relative density	: Not applicable.
Solubility	: Not available.
Solubility in water	: Not available.
Partition coefficient: n-octanol/water	: Not available.
Auto-ignition temperature	: Not available.
Decomposition temperature	: Not available.
Viscosity	: Not applicable.
Flow time (ISO 2431)	: Not available.

## Section 10. Stability and reactivity

Reactivity	: No specific test data related to reactivity available for this product or its ingredients.
Chemical stability	: The product is stable.
Possibility of hazardous reactions	: Under normal conditions of storage and use, hazardous reactions will not occur.
Conditions to avoid	: Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.
Incompatible materials	: Oxidizers
Hazardous decomposition products	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.
Hazardous polymerization	: Under normal conditions of storage and use, hazardous polymerization will not occur.

## Section 11. Toxicological information

### Information on toxicological effects

#### Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
2,3,3,3 - Tetrafluoropropene (R1234yf)	LC50 Inhalation Gas.	Rat	400000 ppm	4 hours
Methyl Chloride	LC50 Inhalation Gas.	Rat	8300 ppm	4 hours
1-Chloro-1,2,2,2-Tetrafluoroethane	LC50 Inhalation Gas.	Rat	600000 ppm	1 hours
1,1,1,2 - tetrafluoroethane	LC50 Inhalation Vapor	Rat	1500 g/m <sup>3</sup>	4 hours

#### Irritation/Corrosion

Flammable Liquefied Gas Mixture: 1,1,1,2-Tetrafluoropropane \ 1,1,1,2,2-Pentafluoropropane \ 2-Chloro-3,3,3-Trifluoropropene \ 2,3,3,3-Tetrafluoropropene \ 3,3,3-Trifluoropropene \ 3,3,3-Trifluoropropyne \ Cis-1-Chloro-2-Fluoro-Ethylene \ Methyl Chloride \ R12-Dichlorodifluoromethane \ R124-Chlorotetrafluoroethane \ R134A-Tetrafluoroethane \ R218-Octafluoropropane \ R244Bb-Chlorotetrafluoropropane \ R244Cc-Chlorotetrafluoropropane \ Trans-1-Chloro-2-Fluoroethylene \ Trans-1,3,3,3-Tetrafluoropropane \ Vinyl Chloride

## Section 11. Toxicological information

Product/ingredient name	Result	Species	Score	Exposure	Observation
Perfluoropropane	Skin - Mild irritant	Rabbit	-	500 microliters	-

### Sensitization

Not available.

### Mutagenicity

Not available.

### Carcinogenicity

Not available.

### Classification

Product/ingredient name	OSHA	IARC	NTP
Methyl Chloride	-	3	-
vinyl chloride	+	1	Known to be a human carcinogen.

### Reproductive toxicity

Not available.

### Teratogenicity

Not available.

### Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
2-Chloro-3,3,3-trifluoropropene	Category 3	Not applicable.	Respiratory tract irritation
3,3,3-trifluoropropyne	Category 3	Not applicable.	Respiratory tract irritation
1-chloro-1,1,2,2-tetrafluoropropane	Category 3	Not applicable.	Respiratory tract irritation
1,1,1,2,2-Pentafluoropropane	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects
Trans-1-Chloro-2-fluoroethylene	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects
(Z)-1-Chloro-2-fluoroethylene	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects
1,1,1,2-Tetrafluoropropane	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects
Propane, 2-chloro-1,1,1,2-tetrafluoro-	Category 3	Not applicable.	Respiratory tract irritation

### Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
Methyl Chloride	Category 2	Not determined	central nervous system (CNS)
vinyl chloride	Category 2	Not determined	liver

### Aspiration hazard

Not available.

Flammable Liquefied Gas Mixture: 1,1,1,2-Tetrafluoropropane \ 1,1,1,2,2-Pentafluoropropane \ 2-Chloro-3,3,3-Trifluoropropene \ 2,3,3,3-Tetrafluoropropene \ 3,3,3-Trifluoropropene \ 3,3,3-Trifluoropropyne \ Cis-1-Chloro-2-Fluoro-Ethylene \ Methyl Chloride \ R12-Dichlorodifluoromethane \ R124-Chlorotetrafluoroethane \ R134A-Tetrafluoroethane \ R218-Octafluoropropane \ R244Bb-Chlorotetrafluoropropane \ R244Cc-Chlorotetrafluoropropane \ Trans-1-Chloro-2-Fluoroethylene \ Trans-1,3,3,3-Tetrafluoropropene \ Vinyl Chloride

## Section 11. Toxicological information

**Information on the likely routes of exposure** : Not available.

### Potential acute health effects

- Eye contact** : Liquid can cause burns similar to frostbite.
- Inhalation** : No known significant effects or critical hazards.
- Skin contact** : Dermal contact with rapidly evaporating liquid could result in freezing of the tissues or frostbite.
- Ingestion** : Ingestion of liquid can cause burns similar to frostbite.

### Symptoms related to the physical, chemical and toxicological characteristics

- Eye contact** : Adverse symptoms may include the following:., frostbite
- Inhalation** : No specific data.
- Skin contact** : Adverse symptoms may include the following:., frostbite
- Ingestion** : Adverse symptoms may include the following:., frostbite

### Delayed and immediate effects and also chronic effects from short and long term exposure

#### Short term exposure

- Potential immediate effects** : Not available.
- Potential delayed effects** : Not available.

#### Long term exposure

- Potential immediate effects** : Not available.
- Potential delayed effects** : Not available.

#### Potential chronic health effects

Not available.

- General** : No known significant effects or critical hazards.
- Carcinogenicity** : No known significant effects or critical hazards.
- Mutagenicity** : No known significant effects or critical hazards.
- Teratogenicity** : No known significant effects or critical hazards.
- Developmental effects** : No known significant effects or critical hazards.
- Fertility effects** : No known significant effects or critical hazards.

### Numerical measures of toxicity

#### Acute toxicity estimates

Not available.

## Section 12. Ecological information

### Toxicity

Product/ingredient name	Result	Species	Exposure
Methyl Chloride	Acute LC50 270000 µg/l Marine water	Fish - Menidia beryllina	96 hours

### Persistence and degradability

Not available.

Flammable Liquefied Gas Mixture: 1,1,1,2-Tetrafluoropropane \ 1,1,1,2,2-Pentafluoropropane \ 2-Chloro-3,3,3-Trifluoropropene \ 2,3,3,3-Tetrafluoropropene \ 3,3,3-Trifluoropropene \ 3,3,3-Trifluoropropyne \ Cis-1-Chloro-2-Fluoro-Ethylene \ Methyl Chloride \ R12-Dichlorodifluoromethane \ R124-Chlorotetrafluoroethane \ R134A-Tetrafluoroethane \ R218-Octafluoropropane \ R244Bb-Chlorotetrafluoropropane \ R244Cc-Chlorotetrafluoropropane \ Trans-1-Chloro-2-Fluoroethylene \ Trans-1,3,3,3-Tetrafluoropropene \ Vinyl Chloride

## Section 12. Ecological information

### Bioaccumulative potential

Product/ingredient name	LogP <sub>ow</sub>	BCF	Potential
2,3,3,3 - Tetrafluoropropene (R1234yf)	2	-	low
Methyl Chloride	0.91	-	low
Methane, dichlorodifluoro-	2.16	6.17	low
1,1,1,2 - tetrafluoroethane	1.06	-	low
HFO-1234ZE	1.6	-	low
vinyl chloride	1.38	-	low

### Mobility in soil

Soil/water partition coefficient (K<sub>oc</sub>) : Not available.

Other adverse effects : No known significant effects or critical hazards.

## Section 13. Disposal considerations

**Disposal methods** : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty Airgas-owned pressure vessels should be returned to Airgas. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

## Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
<b>UN number</b>	UN3161	UN3161	UN3161	UN3161	UN3161
<b>UN proper shipping name</b>	Liquefied gas, flammable n.o.s. (2,3,3,3-Tetrafluoropropene, Tetrafluoroethane)	Liquefied gas, flammable n.o.s. (2,3,3,3-Tetrafluoropropene, Tetrafluoroethane)			
<b>Transport hazard class(es)</b>	2.1 	2.1 	2.1 	2.1 	2.1 
<b>Packing group</b>	-	-	-	-	-
<b>Environmental hazards</b>	No.	No.	No.	No.	No.

“Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product.”

### Additional information

Flammable Liquefied Gas Mixture: 1,1,1,2-Tetrafluoropropane \ 1,1,1,2,2-Pentafluoropropane \ 2-Chloro-3,3,3-Trifluoropropene \ 2,3,3,3-Tetrafluoropropene \ 3,3,3-Trifluoropropene \ 3,3,3-Trifluoropropyne \ Cis-1-Chloro-2-Fluoro-Ethylene \ Methyl Chloride \ R12-Dichlorodifluoromethane \ R124-Chlorotetrafluoroethane \ R134A-Tetrafluoroethane \ R218-Octafluoropropane \ R244Bb-Chlorotetrafluoropropane \ R244Cc-Chlorotetrafluoropropane \ Trans-1-Chloro-2-Fluoroethylene \ Trans-1,3,3,3-Tetrafluoropropene \ Vinyl Chloride

## Section 14. Transport information

**DOT Classification** : **Reportable quantity** 10101 lbs / 4585.9 kg. Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements.

**TDG Classification** : Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.13-2.17 (Class 2).  
**Explosive Limit and Limited Quantity Index** 0.125  
**ERAP Index** 3000  
**Passenger Carrying Ship Index** Forbidden  
**Passenger Carrying Road or Rail Index** Forbidden

**Special precautions for user** : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

**Transport in bulk according to Annex II of MARPOL and the IBC Code** : Not available.

## Section 15. Regulatory information

**U.S. Federal regulations** : **TSCA 5(a)2 final significant new use rules:** 1-Propene, 2,3,3,3-tetrafluoro-  
**TSCA 5(e) substance consent order:** 2-Chloro-3,3,3-trifluoropropene  
**TSCA 8(a) CDR Exempt/Partial exemption:** Not determined  
**TSCA 12(b) one-time export:** 1-Propene, 2,3,3,3-tetrafluoro-  
**Clean Water Act (CWA) 307:** Methyl Chloride; vinyl chloride

**Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs)** : Listed

**Clean Air Act Section 602 Class I Substances** : Not listed

**Clean Air Act Section 602 Class II Substances** : Not listed

**DEA List I Chemicals (Precursor Chemicals)** : Not listed

**DEA List II Chemicals (Essential Chemicals)** : Not listed

### SARA 302/304

#### Composition/information on ingredients

No products were found.

**SARA 304 RQ** : Not applicable.

### SARA 311/312

**Classification** : Refer to Section 2: Hazards Identification of this SDS for classification of substance.

### State regulations

**Massachusetts** : None of the components are listed.

**New York** : None of the components are listed.

**New Jersey** : The following components are listed: FLUORIDES

**Pennsylvania** : None of the components are listed.

### California Prop. 65

Flammable Liquefied Gas Mixture: 1,1,1,2-Tetrafluoropropane \ 1,1,1,2,2-Pentafluoropropane \ 2-Chloro-3,3,3-Trifluoropropene \ 2,3,3,3-Tetrafluoropropene \ 3,3,3-Trifluoropropene \ 3,3,3-Trifluoropropyne \ Cis-1-Chloro-2-Fluoro-Ethylene \ Methyl Chloride \ R12-Dichlorodifluoromethane \ R124-Chlorotetrafluoroethane \ R134A-Tetrafluoroethane \ R218-Octafluoropropane \ R244Bb-Chlorotetrafluoropropane \ R244Cc-Chlorotetrafluoropropane \ Trans-1-Chloro-2-Fluoroethylene \ Trans-1,3,3,3-Tetrafluoropropene \ Vinyl Chloride

## Section 15. Regulatory information

**⚠ WARNING:** This product can expose you to chemicals including Vinyl chloride, which is known to the State of California to cause cancer, and Methyl chloride, 1,1,1,2,2-Pentafluoropropane, which are known to the State of California to cause birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).

Ingredient name	No significant risk level	Maximum acceptable dosage level
Methyl chloride	-	-
Vinyl chloride	Yes.	-
1,1,1,2,2-Pentafluoropropane	-	-

### International regulations

#### Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

#### Montreal Protocol (Annexes A, B, C, E)

Not listed.

#### Stockholm Convention on Persistent Organic Pollutants

Not listed.

#### Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

#### UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

### Inventory list

<b>Australia</b>	: Not determined.
<b>Canada</b>	: Not determined.
<b>China</b>	: Not determined.
<b>Europe</b>	: Not determined.
<b>Japan</b>	: <b>Japan inventory (ENCS):</b> Not determined. <b>Japan inventory (ISHL):</b> Not determined.
<b>Malaysia</b>	: Not determined.
<b>New Zealand</b>	: Not determined.
<b>Philippines</b>	: Not determined.
<b>Republic of Korea</b>	: Not determined.
<b>Taiwan</b>	: Not determined.
<b>Thailand</b>	: Not determined.
<b>Turkey</b>	: Not determined.
<b>United States</b>	: Not determined.
<b>Viet Nam</b>	: Not determined.

## Section 16. Other information

### Hazardous Material Information System (U.S.A.)

Health	/	4
Flammability		0
Physical hazards		3

Flammable Liquefied Gas Mixture: 1,1,1,2-Tetrafluoropropane \ 1,1,1,2,2-Pentafluoropropane \ 2-Chloro-3,3,3-Trifluoropropene \ 2,3,3,3-Tetrafluoropropene \ 3,3,3-Trifluoropropene \ 3,3,3-Trifluoropropyne \ Cis-1-Chloro-2-Fluoro-Ethylene \ Methyl Chloride \ R12-Dichlorodifluoromethane \ R124-Chlorotetrafluoroethane \ R134A-Tetrafluoroethane \ R218-Octafluoropropane \ R244Bb-Chlorotetrafluoropropane \ R244Cc-Chlorotetrafluoropropane \ Trans-1-Chloro-2-Fluoroethylene \ Trans-1,3,3,3-Tetrafluoropropene \ Vinyl Chloride

## Section 16. Other information

**Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings and the associated label are not required on SDSs or products leaving a facility under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered trademark and service mark of the American Coatings Association, Inc.**

The customer is responsible for determining the PPE code for this material. For more information on HMIS® Personal Protective Equipment (PPE) codes, consult the HMIS® Implementation Manual.

### [National Fire Protection Association \(U.S.A.\)](#)



Reprinted with permission from NFPA 704-2001, Identification of the Hazards of Materials for Emergency Response Copyright ©1997, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.

Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

### [Procedure used to derive the classification](#)

Classification	Justification
FLAMMABLE GASES - Category 1 GASES UNDER PRESSURE - Liquefied gas	On basis of test data Expert judgment

### [History](#)

**Date of printing** : 4/2/2018

**Date of issue/Date of revision** : 4/2/2018

**Date of previous issue** : 6/28/2017

**Version** : 1

### [Key to abbreviations](#)

: ATE = Acute Toxicity Estimate  
 BCF = Bioconcentration Factor  
 GHS = Globally Harmonized System of Classification and Labelling of Chemicals  
 IATA = International Air Transport Association  
 IBC = Intermediate Bulk Container  
 IMDG = International Maritime Dangerous Goods  
 LogPow = logarithm of the octanol/water partition coefficient  
 MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)  
 UN = United Nations

### [References](#)

: Not available.

### [Notice to reader](#)

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.