



Material Safety Data Sheet

R410A

Safety Data Sheet (Conforms to Regulation (EC) No 2015/830)

Current Issue Date: April, 2016

SECTION 1 IDENTIFICATION OF THE SUBSTANCE / MIXTURE AND OF THE COMPANY / UNDERTAKING

1.1. Product Identifier

Product name	R410A
Chemical Name	R410A
Synonyms	Not Available
Proper shipping name	LIQUEFIED GAS, N.O.S. (contains difluoromethane and pentafluoroethane)
Other means of identification	Not Available
CAS number	133023-17-3

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

Relevant identified uses	Use according to manufacturer's directions.
Uses advised against	Not Applicable

SECTION 2 HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

Considered a dangerous substance according to Reg. (EC) No 1272/2008 and its amendments. Classified as Dangerous Goods for transport purposes.

CHEMWATCH HAZARD RATINGS

	Min	Max
Flammability	0	
Toxicity	1	2
Body Contact	1	2
Reactivity	1	2
Chronic	0	

0 = Minimum
1 = Low
2 = Moderate
3 = High
4 = Extreme

DSD classification ^[1]	R4	Forms very sensitive explosive metallic compounds.
	R44	Risk of explosion if heated under confinement.

Legend: Classification drawn from EC Directive 67/548/EEC - Annex I . Classification drawn from EC Directive 1272/2008 - Annex VI

DPD classification	In case of substances classification has been prepared by following DSD (Directive 67/548/EEC) and CLP Regulation (EC) No 1272/2008 regulations
Classification according to regulation (EC) No 1272/2008 [CLP] ^[1]	Gas under Pressure (Liquefied gas)
Legend:	Classification drawn from EC Directive 67/548/EEC - Annex I ; Classification drawn from EC Directive 1272/2008 - Annex VI

2.2. Label elements

CLP label elements	
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SIGNAL WORD	WARNING
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Hazard statement(s)

H280	Contains gas under pressure; may explode if heated.
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Supplementary statement(s)

EUH044	Risk of explosion if heated under confinement.
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Precautionary statement(s) Prevention

Not Applicable

Precautionary statement(s) Response

Not Applicable

Precautionary statement(s) Storage

P410+P403	Protect from sunlight. Store in a well-ventilated place.
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Precautionary statement(s) Disposal

Not Applicable

2.3. Other hazards

Inhalation may produce health damage*.

Cumulative effects may result following exposure*.

May produce discomfort of the respiratory system and skin*.

Vapours potentially cause drowsiness and dizziness*.

REACH - Art.57-59: The mixture does not contain Substances of Very High Concern (SVHC) at the SDS print date.

SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

3.1.Substances

1.75-10-5

2.200-839-4

3.Not Available

4.01-2119471312-47-XXXX

1.354-33-6

2.206-557-8

3.Not Available

4.01-2119485636-25-XXXX

1.CAS No 2.EC No 3.Index No 4.REACH No	%[weight]	Name	Classification according to directive 67/548/EEC [DSD]	Classification according to regulation (EC) No 1272/2008 [CLP]
50	<u>R32</u>	R4, R12, R44 ^[1]	Flammable Gas Category 1, Gas under Pressure (Compressed gas); H220, H280, EUH044 ^[1]	
50	<u>R125</u>	R4, R44 ^[1]	Gas under Pressure (Liquefied gas); H280, EUH044 ^[1]	

Legend: Classification drawn from EC Directive 67/548/EEC - Annex I ; Classification drawn from EC Directive 1272/2008 - Annex VI . .

3.2.Mixtures

See 'Information on ingredients' in section 3.1

SECTION 4 FIRST AID MEASURES

4.1. Description of first aid measures

<p style="text-align: center;">General</p>	<p>If skin or hair contact occurs:</p> <ul style="list-style-type: none"> ▶ Flush skin and hair with running water (and soap if available). ▶ Seek medical attention in event of irritation. ▶ If product comes in contact with eyes remove the patient from gas source or contaminated area. ▶ Take the patient to the nearest eye wash, shower or other source of clean water. ▶ Open the eyelid(s) wide to allow the material to evaporate. ▶ Gently rinse the affected eye(s) with clean, cool water for at least 15 minutes. Have the patient lie or sit down and tilt the head back. Hold the eyelid(s) open and pour water slowly over the eyeball(s) at the inner corners, letting the water run out of the outer corners. ▶ The patient may be in great pain and wish to keep the eyes closed. It is important that the material is rinsed from the eyes to prevent further damage. ▶ Ensure that the patient looks up, and side to side as the eye is rinsed in order to better reach all parts of the eye(s) ▶ Transport to hospital or doctor. ▶ Even when no pain persists and vision is good, a doctor should examine the eye as delayed damage may occur. ▶ If the patient cannot tolerate light, protect the eyes with a clean, loosely tied bandage. ▶ Ensure verbal communication and physical contact with the patient. <p>DO NOT allow the patient to rub the eyes DO NOT allow the patient to tightly shut the eyes DO NOT introduce oil or ointment into the eye(s) without medical advice DO NOT use hot or tepid water.</p> <ul style="list-style-type: none"> ▶ Following exposure to gas, remove the patient from the gas source or contaminated area. ▶ NOTE: Personal Protective Equipment (PPE), including positive pressure self-contained breathing apparatus may be required to assure the safety of the rescuer. ▶ Prostheses such as false teeth, which may block the airway, should be removed, where possible, prior to initiating first aid procedures. ▶ If the patient is not breathing spontaneously, administer rescue breathing. ▶ If the patient does not have a pulse, administer CPR. ▶ If medical oxygen and appropriately trained personnel are available, administer 100% oxygen. ▶ Summon an emergency ambulance. If an ambulance is not available, contact a physician, hospital, or Poison Control Centre for further instruction. ▶ Keep the patient warm, comfortable and at rest while awaiting medical care. ▶ MONITOR THE BREATHING AND PULSE, CONTINUOUSLY. ▶ Administer rescue breathing (preferably with a demand-valve resuscitator, bag-valve mask-device, or pocket mask as trained) or CPR if necessary. <p>Not considered a normal route of entry. If poisoning occurs, contact a doctor or Poisons Information Centre.</p> <ul style="list-style-type: none"> ▶ Avoid giving milk or oils. ▶ Avoid giving alcohol.
<p style="text-align: center;">Eye Contact</p>	<ul style="list-style-type: none"> ▶ If product comes in contact with eyes remove the patient from gas source or contaminated area. ▶ Take the patient to the nearest eye wash, shower or other source of clean water. ▶ Open the eyelid(s) wide to allow the material to evaporate. ▶ Gently rinse the affected eye(s) with clean, cool water for at least 15 minutes. Have the patient lie or sit down and tilt the head back. Hold the eyelid(s) open and pour water slowly over the eyeball(s) at the inner corners, letting the water run out of the outer corners. ▶ The patient may be in great pain and wish to keep the eyes closed. It is important that the material is rinsed from the eyes to prevent further damage. ▶ Ensure that the patient looks up, and side to side as the eye is rinsed in order to better reach all parts of the eye(s) ▶ Transport to hospital or doctor. ▶ Even when no pain persists and vision is good, a doctor should examine the eye as delayed damage may occur. ▶ If the patient cannot tolerate light, protect the eyes with a clean, loosely tied bandage. ▶ Ensure verbal communication and physical contact with the patient. <p>DO NOT allow the patient to rub the eyes DO NOT allow the patient to tightly shut the eyes DO NOT introduce oil or ointment into the eye(s) without medical advice DO NOT use hot or tepid water.</p>
<p style="text-align: center;">Skin Contact</p>	<p>If skin or hair contact occurs:</p> <ul style="list-style-type: none"> ▶ Flush skin and hair with running water (and soap if available). ▶ Seek medical attention in event of irritation.
<p style="text-align: center;">Inhalation</p>	<ul style="list-style-type: none"> ▶ Following exposure to gas, remove the patient from the gas source or contaminated area. ▶ NOTE: Personal Protective Equipment (PPE), including positive pressure self-contained breathing apparatus may be required to assure the safety of the rescuer. ▶ Prostheses such as false teeth, which may block the airway, should be removed, where possible, prior to initiating first aid procedures. ▶ If the patient is not breathing spontaneously, administer rescue breathing. ▶ If the patient does not have a pulse, administer CPR. ▶ If medical oxygen and appropriately trained personnel are available, administer 100% oxygen. ▶ Summon an emergency ambulance. If an ambulance is not available, contact a physician, hospital, or Poison Control Centre for further instruction. ▶ Keep the patient warm, comfortable and at rest while awaiting medical care. ▶ MONITOR THE BREATHING AND PULSE, CONTINUOUSLY. ▶ Administer rescue breathing (preferably with a demand-valve resuscitator, bag-valve mask-device, or pocket mask as trained) or CPR if necessary.
<p style="text-align: center;">Ingestion</p>	<p>Not considered a normal route of entry. If poisoning occurs, contact a doctor or Poisons Information Centre.</p> <ul style="list-style-type: none"> ▶ Avoid giving milk or oils.

- ▶ Avoid giving alcohol.

4.2 Most important symptoms and effects, both acute and delayed

See Section 11

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

for intoxication due to Freons/ Halons;

A: Emergency and Supportive Measures

- ▶ Maintain an open airway and assist ventilation if necessary
- ▶ Treat coma and arrhythmias if they occur. Avoid (adrenaline) epinephrine or other sympathomimetic amines that may precipitate ventricular arrhythmias. Tachyarrhythmias caused by increased myocardial sensitisation may be treated with propranolol, 1-2 mg IV or esmolol 25-100 microgm/kg/min IV.
- ▶ Monitor the ECG for 4-6 hours

B: Specific drugs and antidotes:

- ▶ There is no specific antidote

C: Decontamination

- ▶ Inhalation; remove victim from exposure, and give supplemental oxygen if available.
- ▶ Ingestion; (a) Prehospital: Administer activated charcoal, if available. **DO NOT** induce vomiting because of rapid absorption and the risk of abrupt onset CNS depression. (b) Hospital: Administer activated charcoal, although the efficacy of charcoal is unknown. Perform gastric lavage only if the ingestion was very large and recent (less than 30 minutes)

D: Enhanced elimination:

- ▶ There is no documented efficacy for diuresis, haemodialysis, haemoperfusion, or repeat-dose charcoal.

POISONING and DRUG OVERDOSE, Californian Poison Control System Ed. Kent R Olson; 3rd Edition

- ▶ Do not administer sympathomimetic drugs unless absolutely necessary as material may increase myocardial irritability.
- ▶ No specific antidote.
- ▶ Because rapid absorption may occur through lungs if aspirated and cause systematic effects, the decision of whether to induce vomiting or not should be made by an attending physician.
- ▶ If lavage is performed, suggest endotracheal and/or esophageal control.
- ▶ Danger from lung aspiration must be weighed against toxicity when considering emptying the stomach.
- ▶ Treatment based on judgment of the physician in response to reactions of the patient

For gas exposures:

BASIC TREATMENT

- ▶ Establish a patent airway with suction where necessary.
- ▶ Watch for signs of respiratory insufficiency and assist ventilation as necessary.
- ▶ Administer oxygen by non-rebreather mask at 10 to 15 l/min.
- ▶ Monitor and treat, where necessary, for pulmonary oedema .
- ▶ Monitor and treat, where necessary, for shock.
- ▶ Anticipate seizures.

ADVANCED TREATMENT

- ▶ Consider orotracheal or nasotracheal intubation for airway control in unconscious patient or where respiratory arrest has occurred.
- ▶ Positive-pressure ventilation using a bag-valve mask might be of use.
- ▶ Monitor and treat, where necessary, for arrhythmias.
- ▶ Start an IV D5W TKO. If signs of hypovolaemia are present use lactated Ringers solution. Fluid overload might create complications.
- ▶ Drug therapy should be considered for pulmonary oedema.
- ▶ Hypotension with signs of hypovolaemia requires the cautious administration of fluids. Fluid overload might create complications.
- ▶ Treat seizures with diazepam.
- ▶ Proparacaine hydrochloride should be used to assist eye irrigation.

BRONSTEIN, A.C. and CURRANCE, P.L.

EMERGENCY CARE FOR HAZARDOUS MATERIALS EXPOSURE: 2nd Ed. 1994

SECTION 5 FIREFIGHTING MEASURES

5.1. Extinguishing media

SMALL FIRE: Use extinguishing agent suitable for type of surrounding fire.

LARGE FIRE: Cool cylinder.

DO NOT direct water at source of leak or venting safety devices as icing may occur.

5.2. Special hazards arising from the substrate or mixture

Fire Incompatibility

- ▶ Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result

5.3. Advice for firefighters

Fire Fighting

GENERAL

- ▶ Alert Fire Brigade and tell them location and nature of hazard.
- ▶ Wear breathing apparatus and protective gloves.
- ▶ Fight fire from a safe distance, with adequate cover.
- ▶ Use water delivered as a fine spray to control fire and cool adjacent area.

Fire/Explosion Hazard	<ul style="list-style-type: none"> ▶ Containers may explode when heated - Ruptured cylinders may rocket ▶ Fire exposed containers may vent contents through pressure relief devices. ▶ High concentrations of gas may cause asphyxiation without warning. ▶ May decompose explosively when heated or involved in fire. ▶ Contact with gas may cause burns, severe injury and/ or frostbite. <p>Decomposition may produce toxic fumes of; carbon monoxide (CO) carbon dioxide (CO₂) hydrogen chloride phosgenę hydrogen fluoride, other pyrolysis products typical of burning organic materialContains low boiling substance: Closed containers may rupture due to pressure buildup under fire conditions.</p>
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SECTION 6 ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

See section 8

6.2. Environmental precautions

See section 12

6.3. Methods and material for containment and cleaning up

Minor Spills	<ul style="list-style-type: none"> ▶ Avoid breathing vapour and any contact with liquid or gas. Protective equipment including respirator should be used. ▶ DO NOT enter confined spaces were gas may have accumulated. ▶ Increase ventilation.
Major Spills	<ul style="list-style-type: none"> ▶ Clear area of all unprotected personnel and move upwind. ▶ Alert Emergency Authority and advise them of the location and nature of hazard. ▶ Wear breathing apparatus and protective gloves. ▶ Prevent by any means available, spillage from entering drains and water-courses. ▶ Remove leaking cylinders to a safe place. ▶ Fit vent pipes. Release pressure under safe, controlled conditions ▶ Burn issuing gas at vent pipes. ▶ DO NOT exert excessive pressure on valve; DO NOT attempt to operate damaged valve.

6.4. Reference to other sections

Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 HANDLING AND STORAGE

7.1. Precautions for safe handling

Safe handling	▶ Vented gas is more dense than air and may collect in pits, basements.
Fire and explosion protection	See section 5
Other information	<ul style="list-style-type: none"> ▶ Cylinders should be stored in a purpose-built compound with good ventilation, preferably in the open. ▶ Such compounds should be sited and built in accordance with statutory requirements. ▶ The storage compound should be kept clear and access restricted to authorised personnel only. ▶ Cylinders stored in the open should be protected against rust and extremes of weather.

7.2. Conditions for safe storage, including any incompatibilities

Suitable container	<ul style="list-style-type: none"> ▶ DO NOT use aluminium or galvanised containers <p>[Cylinder: Steel Packaging] Ensure the use of equipment rated for cylinder pressure. Ensure the use of compatible materials of construction. Valve protection cap to be in place until cylinder is secured, connected. Cylinder must be properly secured either in use or in storage. Cylinder valve must be closed when not in use or when empty. Segregate full from empty cylinders WARNING: Suckback into cylinder may result in rupture. Use back-flow preventive device in piping.</p>
Storage incompatibility	<ul style="list-style-type: none"> ▶ Avoid reaction with oxidising agents ▶ Avoid magnesium, aluminium and their alloys, brass and steel. <p>Haloalkanes:</p> <ul style="list-style-type: none"> ▶ are highly reactive: some of the more lightly substituted lower members are highly flammable; the more highly substituted may be used as fire suppressants, not always with the anticipated results. ▶ may react with the lighter divalent metals to produce more reactive compounds analogous to Grignard reagents. ▶ may produce explosive compounds following prolonged contact with metallic or other azides ▶ may react on contact with potassium or its alloys - although apparently stable on contact with a wide range of halocarbons, reaction products may be shock-sensitive and may explode with great violence on light impact; severity generally increases with the degree of halocarbon substitution and potassium-sodium alloys give extremely sensitive mixtures . <p>BREITHERICK L.: Handbook of Reactive Chemical Hazards</p> <ul style="list-style-type: none"> ▶ react with metal halides and active metals, eg. sodium (Na), potassium (K), lithium (Li), calcium (Ca), zinc (Zn), powdered aluminium (Al) and aluminium alloys, magnesium (Mg) and magnesium alloys.

7.3. Specific end use(s)

See section 1.2

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1. Control parameters

DERIVED NO EFFECT LEVEL (DNEL)

Not Available

PREDICTED NO EFFECT LEVEL (PNEC)

Not Available

OCCUPATIONAL EXPOSURE LIMITS (OEL)

INGREDIENT DATA


Source	Ingredient	Material name	TWA	STEL	Peak	Notes
Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available

EMERGENCY LIMITS

Ingredient	Material name	TEEL-1	TEEL-2	TEEL-3
R32	Methylene fluoride; (Difluoromethane; HFC-32)	1,300 ppm	1300 ppm	39000 ppm

Ingredient	Original IDLH	Revised IDLH
R32	Not Available	Not Available
R125	Not Available	Not Available

8.2. Exposure controls

8.2.1. Appropriate engineering controls	<p>Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.</p> <p>The basic types of engineering controls are:</p> <p>Process controls which involve changing the way a job activity or process is done to reduce the risk.</p> <p>Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment.</p>
8.2.2. Personal protection	
Eye and face protection	<ul style="list-style-type: none"> ▶ Safety glasses with side shields ▶ Chemical goggles. ▶ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience.
Skin protection	See Hand protection below
Hands/feet protection	▶ When handling sealed and suitably insulated cylinders wear cloth or leather gloves.
Body protection	See Other protection below
Other protection	<ul style="list-style-type: none"> ▶ Positive pressure, full face, air-supplied breathing apparatus should be used for work in enclosed spaces if a leak is suspected or the primary containment is to be opened (e.g. for a cylinder change) ▶ Air-supplied breathing apparatus is required where release of gas from primary containment is either suspected or demonstrated. ▶ Protective overalls, closely fitted at neck and wrist. ▶ Eye-wash unit. ▶ Ensure availability of lifeline in confined spaces. ▶ Staff should be trained in all aspects of rescue work.
Thermal hazards	Not Available

Respiratory protection

Type AX Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

Where the concentration of gas/particulates in the breathing zone, approaches or exceeds the "Exposure Standard" (or ES), respiratory protection is required.

Degree of protection varies with both face-piece and Class of filter; the nature of protection varies with Type of filter.

Required Minimum Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator
up to 10 x ES	AX-AUS P3	-	AX-PAPR-AUS / Class 1 P3
up to 50 x ES	-	AX-AUS / Class 1 P3	-
up to 100 x ES	-	AX-2 P3	AX-PAPR-2 P3 ^

^ - Full-face

A(All classes) = Organic vapours, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN), E = Sulfur dioxide(SO₂), G = Agricultural chemicals, K = Ammonia(NH₃), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)

8.2.3. Environmental exposure controls

See section 12

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Appearance	Colourless liquefied gas with slight ethereal odour; does not mix with water.		
Physical state	Liquefied Gas	Relative density (Water = 1)	1.11
Odour	Not Available	Partition coefficient n-octanol / water	Not Available
Odour threshold	Not Available	Auto-ignition temperature (°C)	Not Available
pH (as supplied)	~7	Decomposition temperature	Not Available
Melting point / freezing point (°C)	Not Available	Viscosity (cSt)	0.150 @25C
Initial boiling point and boiling range (°C)	-52.7	Molecular weight (g/mol)	Not Applicable
Flash point (°C)	Not Applicable	Taste	Not Available
Evaporation rate	Not Available	Explosive properties	Not Available
Flammability	Not Applicable	Oxidising properties	Not Available
Upper Explosive Limit (%)	Not Applicable	Surface Tension (dyn/cm or mN/m)	Not Available
Lower Explosive Limit (%)	Not Applicable	Volatile Component (%vol)	100
Vapour pressure (kPa)	1246 @15C	Gas group	Not Available
Solubility in water (g/L)	Immiscible	pH as a solution (1%)	Not Applicable
Vapour density (Air = 1)	2.3	VOC g/L	Not Available

9.2. Other information

Not Available

SECTION 10 STABILITY AND REACTIVITY

10.1.Reactivity	See section 7.2
10.2.Chemical stability	<ul style="list-style-type: none">▶ Unstable in the presence of incompatible materials.▶ Product is considered stable.▶ Hazardous polymerisation will not occur.▶ Extremely high temperatures.
10.3. Possibility of hazardous reactions	See section 7.2
10.4. Conditions to avoid	See section 7.2
10.5. Incompatible materials	See section 7.2
10.6. Hazardous decomposition products	See section 5.3

SECTION 11 TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Inhaled	<p>Inhalation of vapours may cause drowsiness and dizziness. This may be accompanied by sleepiness, reduced alertness, loss of reflexes, lack of co-ordination, and vertigo.</p> <p>Symptoms of asphyxia (suffocation) may include headache, dizziness, shortness of breath, muscular weakness, drowsiness and ringing in the ears. If the asphyxia is allowed to progress, there may be nausea and vomiting, further physical weakness and unconsciousness and, finally, convulsions, coma and death.</p> <p>The use of a quantity of material in an unventilated or confined space may result in increased exposure and an irritating atmosphere developing. Before starting consider control of exposure by mechanical ventilation.</p>
Ingestion	<p>Overexposure is unlikely in this form.</p> <p>Not normally a hazard due to physical form of product.</p> <p>Considered an unlikely route of entry in commercial/industrial environments</p>
Skin Contact	Fluorocarbons remove natural oils from the skin, causing irritation, dryness and sensitivity.
Eye	Although the material is not thought to be an irritant (as classified by EC Directives), direct contact with the eye may produce transient discomfort characterised by tearing or conjunctival redness (as with windburn).
Chronic	<p>Principal route of occupational exposure to the gas is by inhalation.</p> <p>Fluorocarbons can cause an increased risk of cancer, spontaneous abortion and birth defects.</p>

R410A	TOXICITY	IRRITATION
	Not Available	Not Available
R32	TOXICITY	IRRITATION
	Inhalation (rat) LC50: >760000 ppm/4h *[2]	Nil reported (DuPont)
	Inhalation (rat) LC50: 1890 mg/L/4H ^[2]	
	Oral (rat) LD50: 1890 mg/kg ^[2]	
R125	TOXICITY	IRRITATION
	Inhalation (rat) LC50: >709000 ppm/4h *[2]	Nil reported * [
	Inhalation (rat) LC50: 2910 mg/L/4H ^[2]	
	Inhalation (rat) LC50: 800000 ppm/4h*[2]	
Legend:	1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2. * Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances	

R410A	Acute toxicity - Inhalation, LC 0, 4 h, rat, > 52 % v/v air (R125/R32) Irritation - No irritation signs noted during toxicity testing. (R125/R32) Chronic toxicity - Inhalation, after a single exposure, dog, >= 10% v/v air, cardiac sensitization following adrenergic stimulation (Data relative to R125) - Inhalation, after repeated exposure, rat, Target organ: central nervous system, >= 5% v/v air (R32) - No mutagenic, teratogenic effects (R125/R32) - Foetotoxic effect (R32)
R125	Cardiac sensitisation threshold limit >245400 mg/m3 Anaesthetic effects threshold limit 490800 mg/m3 * DuPont SDS

Acute Toxicity	☉	Carcinogenicity	☉
Skin Irritation/Corrosion	☉	Reproductivity	☉
Serious Eye Damage/Irritation	☉	STOT - Single Exposure	☉
Respiratory or Skin sensitisation	☉	STOT - Repeated Exposure	☉
Mutagenicity	☉	Aspiration Hazard	☉

Legend: ✘ – Data available but does not fill the criteria for classification
✔ – Data required to make classification available
☉ – Data Not Available to make classification

SECTION 12 ECOLOGICAL INFORMATION

12.1. Toxicity

Ingredient	Endpoint	Test Duration (hr)	Species	Value	Source
R32	EC50	384	Crustacea	17.989mg/L	3
R32	LC50	96	Fish	77.251mg/L	3
R32	NOEC	96	Fish	10mg/L	2
R32	EC50	48	Crustacea	>97.9mg/L	2
R32	EC50	72	Algae or other aquatic plants	>114mg/L	2
R125	EC50	384	Crustacea	10.310mg/L	3
R125	LC50	96	Fish	43.427mg/L	3
R125	NOEC	96	Fish	10mg/L	2
R125	EC50	48	Crustacea	>97.9mg/L	2
R125	EC50	72	Algae or other aquatic plants	>114mg/L	2

Legend:

Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 - Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data

DO NOT discharge into sewer or waterways.

[Mobility] - Air, Henrys law constant (H) ca. 150kPa.m³/mol | Result: considerable volatility | Conditions: 20 °C / calculated value | (Data relative to R125) | - Air, Henrys law constant (H) ca. 19.7kPa.m³/mol | Result: considerable volatility | Conditions: 25 °C / calculated value | (R32) | - Soil/sediments, adsorption, log KOC from 1.05 - 1.7 | Conditions: calculated value | (R125/R32) | Persistence and degradability | Abiotic degradation | - Air, indirect photo-oxidation, t 1/2 = 28.2 year(s) | Conditions: sensitizer: OH radicals | Degradations products: carbon dioxide / fluorhydric acid / trifluoroacetic acid | (Data relative to R125) | - Air, indirect photo-oxidation, t 1/2 = 4.16 year(s) | Conditions: sensitizer: OH radicals | Degradations products: carbon dioxide / fluorhydric acid | (R32) | - Air, photolysis, ODP = 0 | Result: no effect on stratospheric ozone | Reference value for CFC 11: ODP = 1. (R125/R32) | - Air, greenhouse effect, GWP It; 0.5 | Reference value for CFC 11: GWP = 1. (R125/R32) | Biotic degradation | - Aerobic, test ready biodegradability/closed bottle, degradation from 4 - 5 %, 28 day(s) | Result: non-readily biodegradable | (R125/R32) | Bioaccumulative potential | - Bioconcentration: log Po/w from 0.21 - 1.48 | Result: non-bioaccumulable | Conditions: measured value | (R125/R32)

12.2. Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
R32	LOW	LOW
R125	HIGH	HIGH

12.3. Bioaccumulative potential

Ingredient	Bioaccumulation
R32	LOW (LogKOW = 0.2)
R125	LOW (LogKOW = 1.5472)

12.4. Mobility in soil

Ingredient	Mobility
R32	LOW (KOC = 23.74)
R125	LOW (KOC = 154.4)

12.5. Results of PBT and vPvB assessment

	P	B	T
Relevant available data	Not Available	Not Available	Not Available
PBT Criteria fulfilled?	Not Available	Not Available	Not Available

12.6. Other adverse effects

No data available

SECTION 13 DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Product / Packaging disposal	<ul style="list-style-type: none"> ▶ Evaporate residue at an approved site. ▶ Return empty containers to supplier. If containers are marked non-returnable establish means of disposal with manufacturer prior to purchase. ▶ Ensure damaged or non-returnable cylinders are gas-free before disposal.
Waste treatment options	Not Available
Sewage disposal options	Not Available

SECTION 14 TRANSPORT INFORMATION

Labels Required

	
Marine Pollutant	NO
HAZCHEM	Not Applicable

Land transport (ADR)

14.1. UN number	3163										
14.2. Packing group	Not Applicable										
14.3. UN proper shipping name	LIQUEFIED GAS, N.O.S. (contains difluoromethane and pentafluoroethane)										
14.4. Environmental hazard	Not Applicable										
14.5. Transport hazard class(es)	Class : 2.2 Subrisk : Not Applicable										
14.6. Special precautions for user	<table border="0"> <tr> <td>Hazard identification (Kemler)</td> <td>20</td> </tr> <tr> <td>Classification code</td> <td>2A</td> </tr> <tr> <td>Hazard Label</td> <td>2.2</td> </tr> <tr> <td>Special provisions</td> <td>274 662</td> </tr> <tr> <td>Limited quantity</td> <td>120 ml</td> </tr> </table>	Hazard identification (Kemler)	20	Classification code	2A	Hazard Label	2.2	Special provisions	274 662	Limited quantity	120 ml
Hazard identification (Kemler)	20										
Classification code	2A										
Hazard Label	2.2										
Special provisions	274 662										
Limited quantity	120 ml										

Air transport (ICAO-IATA / DGR)

14.1. UN number	3163	
14.2. Packing group	Not Applicable	
14.3. UN proper shipping name	Liquefied gas, n.o.s. * (contains difluoromethane and pentafluoroethane)	
14.4. Environmental hazard	Not Applicable	
14.5. Transport hazard class(es)	ICAO/IATA Class	2.2
	ICAO / IATA Subrisk	Not Applicable
	ERG Code	2L
14.6. Special precautions for user	Special provisions	Not Applicable
	Cargo Only Packing Instructions	200
	Cargo Only Maximum Qty / Pack	150 kg
	Passenger and Cargo Packing Instructions	200
	Passenger and Cargo Maximum Qty / Pack	75 kg
	Passenger and Cargo Limited Quantity Packing Instructions	Forbidden
	Passenger and Cargo Limited Maximum Qty / Pack	Forbidden

Sea transport (IMDG-Code / GGVSee)

14.1. UN number	3163	
14.2. Packing group	Not Applicable	
14.3. UN proper shipping name	LIQUEFIED GAS, N.O.S. (contains difluoromethane and pentafluoroethane)	
14.4. Environmental hazard	Not Applicable	
14.5. Transport hazard class(es)	IMDG Class	2.2
	IMDG Subrisk	Not Applicable
14.6. Special precautions for user	EMS Number	F-C, S-V
	Special provisions	274
	Limited Quantities	120 mL

Inland waterways transport (ADN)

14.1. UN number	3163	
14.2. Packing group	Not Applicable	
14.3. UN proper shipping name	LIQUEFIED GAS, N.O.S. (contains difluoromethane and pentafluoroethane)	
14.4. Environmental hazard	Not Applicable	
14.5. Transport hazard class(es)	2.2 Not Applicable	
14.6. Special precautions for user	Classification code	2A
	Special provisions	274; 662
	Limited quantity	120 ml
	Equipment required	PP
	Fire cones number	0

Transport in bulk according to Annex II of MARPOL and the IBC code

Not Applicable

SECTION 15 REGULATORY INFORMATION**15.1. Safety, health and environmental regulations / legislation specific for the substance or mixture****R32(75-10-5) IS FOUND ON THE FOLLOWING REGULATORY LISTS**

EU REACH Regulation (EC) No 1907/2006 - Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles

European Customs Inventory of Chemical Substances ECICS (English)

European Union - European Inventory of Existing Commercial Chemical Substances (EINECS) (English)

International Air Transport Association (IATA) Dangerous Goods Regulations - Prohibited List Passenger and Cargo Aircraft

R125(354-33-6) IS FOUND ON THE FOLLOWING REGULATORY LISTS

European Customs Inventory of Chemical Substances ECICS (English)

European Union - European Inventory of Existing Commercial Chemical Substances (EINECS) (English)

This safety data sheet is in compliance with the following EU legislation and its adaptations - as far as applicable - : 67/548/EEC, 1999/45/EC, 98/24/EC, 92/85/EC, 94/33/EC, 91/689/EEC, 1999/13/EC, Commission Regulation (EU) 2015/830, Regulation (EC) No 1272/2008 and their amendments as well as the following British legislation: - The Control of Substances Hazardous to Health Regulations (COSHH) 2002 - COSHH Essentials - The Management of Health and Safety at Work Regulations 1999

15.2. Chemical safety assessment

For further information please look at the Chemical Safety Assessment and Exposure Scenarios prepared by your Supply Chain if available.

ECHA SUMMARY

Ingredient	CAS number	Index No	ECHA Dossier
R32	75-10-5	Not Available	01-2119471312-47-XXXX

Harmonisation (C&L Inventory)	Hazard Class and Category Code(s)	Pictograms Signal Word Code(s)	Hazard Statement Code(s)
1	Flam. Gas 1, Liq. Gas	GHS02, GHS04, Dgr	H220, H280
2	Flam. Gas 1, Liq. Gas, Muta. 1B, Carc. 1A, Press. Gas.	GHS02, GHS04, Dgr, Wng	H220, H280, H312

Harmonisation Code 1 = The most prevalent classification. Harmonisation Code 2 = The most severe classification.

Ingredient	CAS number	Index No	ECHA Dossier
R125	354-33-6	Not Available	01-2119485636-25-XXXX

Harmonisation (C&L Inventory)	Hazard Class and Category Code(s)	Pictograms Signal Word Code(s)	Hazard Statement Code(s)
1	Press. Gas.	GHS04, Wng	H280
2	Press. Gas., Liq. Gas, STOT SE 2	GHS04, Wng, GHS08	H280, H371

Harmonisation Code 1 = The most prevalent classification. Harmonisation Code 2 = The most severe classification.

National Inventory	Status
Australia - AICS	Y
Canada - DSL	Y
Canada - NDSL	N (R32; R125)
China - IECSC	Y
Europe - EINEC / ELINCS / NLP	Y
Japan - ENCS	Y
Korea - KECI	Y
New Zealand - NZIoC	Y
Philippines - PICCS	Y
USA - TSCA	Y
Legend:	Y = All ingredients are on the inventory N = Not determined or one or more ingredients are not on the inventory and are not exempt from listing(see specific ingredients in brackets)

SECTION 16 OTHER INFORMATION**Full text Risk and Hazard codes**

H220	Extremely flammable gas.
H312	Harmful in contact with skin.
H371	May cause damage to organs.
R12	Extremely flammable.

Other information**DSD / DPD label elements**

Not Applicable

Relevant risk statements are found in section 2.1

Indication(s) of danger	Not Applicable
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SAFETY ADVICE

S02	Keep out of reach of children.
S03	Keep in a cool place.
S15	Keep away from heat.
S35	This material and its container must be disposed of in a safe way.
S56	Dispose of this material and its container at hazardous or special waste collection point.

A list of reference resources used to assist the committee may be found at:

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

For detailed advice on Personal Protective Equipment, refer to the following EU CEN Standards:

EN 166 Personal eye-protection

EN 340 Protective clothing

EN 374 Protective gloves against chemicals and micro-organisms

EN 13832 Footwear protecting against chemicals

EN 133 Respiratory protective devices

Definitions and abbreviations

PC—TWA: Permissible Concentration-Time Weighted Average

PC—STEL: Permissible Concentration-Short Term Exposure Limit

IARC: International Agency for Research on Cancer

ACGIH: American Conference of Governmental Industrial Hygienists

STEL: Short Term Exposure Limit

TEEL: Temporary Emergency Exposure Limit.

IDLH: Immediately Dangerous to Life or Health Concentrations

OSF: Odour Safety Factor

NOAEL :No Observed Adverse Effect Level

LOAEL: Lowest Observed Adverse Effect Level

TLV: Threshold Limit Value

LOD: Limit Of Detection

OTV: Odour Threshold Value

BCF: BioConcentration Factors

BEI: Biological Exposure Index