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

1.1 Product identifier

<table>
<thead>
<tr>
<th>Product name</th>
<th>R437A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical name, formula</td>
<td>C5H12 8624,481PPM, C4H10 2,4980 %; C2HF5 16,8495 %; C2H2F4 79,7900 %</td>
</tr>
<tr>
<td>CAS</td>
<td>C2H3F3, R143a, Trifluoroethane, CAS nr 420-46-2, 78,5% (w/w)</td>
</tr>
<tr>
<td></td>
<td>C2H2F4, R134a, 1,1,1,2-Tetrafluoroethane, CAS nr 811-97-2, 19,5% (w/w)</td>
</tr>
<tr>
<td></td>
<td>C4H10, R600A, Butane, CAS nr 106-97-8, 1,4% (w/w)</td>
</tr>
<tr>
<td></td>
<td>C5H12, R601, Pentane, CAS nr 109-66-0, 0,6% (w/w)</td>
</tr>
</tbody>
</table>

1.2 Relevant identified uses of the substance

<table>
<thead>
<tr>
<th>Identified uses</th>
<th>Industrial and professional use. Perform risk assessment prior to use.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Refrigerant. Transfilling gas or liquid.</td>
</tr>
<tr>
<td></td>
<td>Using gas alone or in mixtures for the calibration of analysis equipment.</td>
</tr>
<tr>
<td>Use advised against</td>
<td>Consumer use.</td>
</tr>
</tbody>
</table>

1.3 Details of the supplier of the safety data sheet

Darment Oy

| VAT | FI09368266 |
| Address | Ruosilantie 18 |
| Postal code and city | 00390 HELSINKI, FINLAND |
| Telephone | +358 20 5588 250 |
| E-mail | info@darment.fi |
| www-site | www.darment.eu |

Emergency telephone numbers in Finland

tel. 112, Your country: _______________
tel. 0800 147 111, HUS Poison Information Center of Helsinki, free calls fi, tel. 09 471 977, open 24 h/day.

SECTION 2: HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

Classification according to Regulation (EU) No 1272/2008 as amended.

Physical Hazards
Gases under pressure
Liquefied gas H280: Contains gas under pressure; may explode if heated.
2.2 Label Elements

Warning label

Signal Words: Warning

Hazard Statement/-s:
- CLP H280 – Contains gas under pressure; may explode if heated.
- CLP H281 – Contains Refrigerated gases, may cause cryogenic burns or injury.

Precautionary Statements
- Prevention: None.
- Response: None.
- Storage: R410 + P403: Store in a well-ventilated place.
- Disposal: None.

- CLP P282 – Wear cold insulating gloves/ Face shield/ Eye protection
- CLP P336 – Thaw frosted parts in lukewarm water. Do not rub affected area.
- CLP P315 – Get immediate medical advice/attention. CLP P403 – Store in a well ventilated place.

Supplemental label information
- EIGA-0783: Contains fluorinated greenhouse gases
- EIGA-As: Asphyxiant in high concentrations.

2.3 Other hazards

Contact with evaporating liquid may cause frostbite or freezing of skin.

SECTION 3: COMPOSITION / INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Chemical name, trade name</th>
<th>CAS No, EC-No, REACH Reg. No</th>
<th>Purity</th>
</tr>
</thead>
</table>

See next page.
3.2 Mixtures (**)

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS EC-No</th>
<th>REACH Registration No</th>
<th>Concentration</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pentane, C5H12, R601</td>
<td>109-66-0</td>
<td>203-692-4</td>
<td>8.624,4816 PPM</td>
<td>Asp. Tox. 1; H304, STOT SE 3; H336, Aquatic Chronic 2; H411, Flam. Liq. 1; H224, #, Note C*</td>
</tr>
<tr>
<td>Butane, C4H10, R600</td>
<td>106-97-8</td>
<td>203-448-7</td>
<td>2,4980 %</td>
<td>#, Flammable gas, Category 1; Gas under pressure (Liquefied gas); H220, H280, #</td>
</tr>
<tr>
<td>Pentfluoroethane, C2HF5</td>
<td>354-33-6</td>
<td>206-557-8</td>
<td>16,8495%</td>
<td>Gas under pressure (Liquefied gas); H280, N.A.</td>
</tr>
<tr>
<td>Tetrafluoroethane, C2H2F4, R134a</td>
<td>811-97-2</td>
<td>212-377-0</td>
<td>79,7900%</td>
<td>Gas under pressure (Liquefied gas); H280, N.A.</td>
</tr>
</tbody>
</table>

Classification drawn from Regulation (EU) No 1272/2008 - Annex VI. All concentrations are by weight unless the ingredient is a gas. Gas concentrations are moles. Concentrations are nominal. # Substance has occupational exposure limit value. * Note C: Some organic substances may be marketed either in a specific isomeric form or as a mixture of several isomers. In this case the supplier must state on the label whether the substance is a specific isomer or a mixture of isomers.

SECTION 4: FIRST AID MEASURES

### 4.1 Description of first aid measures

**Inhalation:** In high concentrations may cause asphyxiation. Symptoms may include loss of mobility or consciousness. Victim may not be aware of asphyxiation. Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor or 112. Apply artificial respiration if breathing stopped.

**Skin contact:** Contact with evaporating liquid may cause frostbite or freezing of skin.

**Eye contact:** Rinse the eye with water immediately. Remove contact lenses, if present and easy to do. Continue rinsing. Flush thoroughly with water for at least 15 minutes. Get immediate medical assistance. If medical assistance is not immediately available, flush an additional 15 minutes.

**Ingestion:** Ingestion is not considered a potential route of exposure. But in case of ingestion, seek medical advice immediately and show the safety data sheet for this product. Avoid giving milk, oils and alcohol.

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

Respiratory arrest, stopping. Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling.

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

**Hazards:** Respiratory arrest. Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling.

**Treatment:** Thaw frosted parts with lukewarm water. Do not rub affected area. Get immediate medical advice/attention. Or call 112 and ask advice.

SECTION 5: FIREFIGHTING MEASURES

Heat may cause the containers to explode.
5.1 Extinguishing media

Suitable extinguishing media: In case of fire in the surroundings: use appropriate extinguishing agent

Large fire: Cool cylinder.

Unsuitable Extinguishing media: None.

Do not direct water at source of leak or venting safety devices as icing may occur.

5.2 Special hazards arising from the substance or mixture

Fire or excessive heat may produce hazardous decomposition products. Hazardous Combustion Products: If involved in a fire the following toxic and/or corrosive fumes may be produced by thermal decomposition: Carbon oxides fluorocarbons Hydrogen fluoride; Carbonyl difluoride.

5.3 Advice for firefighters

Special fire fighting procedures: In case of fire stop leak if safe to do so. Continue spraying water from protected position until container stays cool. Use extinguishant. Isolate the source of the fire or let it burn out.

Follow the internal emergency plan and general accident and emergency guidelines.

Depending on the intensity of the fire, it may be necessary to wear full protective clothing and self-contained breathing apparatus. Safety equipment and first aid equipment must be available at the minimum level.

Firefighters must wear standard protective equipment: a fire-resistant jacket, a helmet with a face shield, gloves and rubber boots even in an enclosed area with an oxygen device.

Instructions: EN 469 Protective clothing for firefighters. Requirements and test methods for fire rating. EN 15090 Safety footwear for firefighters. EN 659 Protective gloves for firefighters. EN 443 Helmets for fire fighting in houses and others constructions. Standard EN 137 Compressed air breathing apparatus - Portable open circuit compressed air devices - Requirements, testing, marking.

SECTION 6: ACCIDENTAL RELEASE MEASURES
6.1 Personal precautions, protective equipments and emergency procedures

- Evacuate area. Provide adequate ventilation.

- Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.

- Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe.

- Standard EN 137 Respiratory protective devices – Self-contained open-circuit compressed air breathing apparatus with full face mask – Requirements, testing, marking.

6.2 Environmental precautions
The product is not classified as dangerous for the environment. Keep away from drains, surface and ground water. Prevent further leakage if safe to do so.

6.3 Methods and material for containment and cleaning up

- Avoid breathing vapour and any contact with liquid or gas.
- Protective equipment including respirator should be used.
- DO NOT enter confined spaces where gas may have accumulated.
- Increase ventilation.

Major Spills:
- 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 References to other sections

Refer to sections 8 and 13.
SECTION 7: HANDLING AND STORAGE

7.1 Precautions for safe handling

- Only experienced and properly instructed persons should handle gases under pressure.
- Use only properly specified equipment which is suitable for this product, its supply pressure and temperature.
- Refer to supplier’s handling instructions.
- The substance must be handled in accordance with good industrial hygiene and safety procedures.
- Protect containers from physical damage; do not drag, roll, slide or drop.
- Do not remove or deface labels provided by the supplier for the identification of the container contents.
- When moving containers, even for short distances, use appropriate equipment eg. trolley, hand truck, fork truck etc.
- Secure cylinders in an upright position at all times, close all valves when not in use.
- Provide adequate ventilation.
- Suck back of water into the container must be prevented.
- Do not allow backfeed into the container.
- Avoid suckback of water, acid and alkalis.
- Keep container below 50°C in a well ventilated place.
- Observe all regulations and local requirements regarding storage of containers.
- When using do not eat, drink or smoke.
- Observe all legal and local requirements for the storage of cylinders / containers.
- Never use direct flame or electrical heating devices to raise the pressure of a container.
- Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use.
- Damaged valves should be reported immediately to the supplier. Close container valve after each use and when empty, even if still connected to equipment.
- Never attempt to repair or modify container valves or safety relief devices.
- Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment.
- Keep container valve outlets clean and free from contaminates particularly oil and water.
- If user experiences any difficulty operating container valve discontinue use and contact supplier.
- Never attempt to transfer gases from one container to another.
- Container valve guards or caps should be in place.

7.2 Conditions for safe storage including any incompatibilities

- Containers should not be stored in conditions likely to encourage corrosion.
- Stored containers should be periodically checked for general conditions and leakage.
- Container valve guards or caps should be in place.
- Store containers in location free from fire risk and away from sources of heat and ignition.
- Keep away from combustible material.

7.3 Specific end use(s)

None.
**SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION**

### 8.1 Control parameters

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>Type</th>
<th>Exposure limit</th>
<th>Lähde</th>
</tr>
</thead>
<tbody>
<tr>
<td>Butane</td>
<td>HTP 15min</td>
<td>1000 ppm 2400 mg/m³</td>
<td>Finland. Occupational Exposure Limits 05/2012</td>
</tr>
<tr>
<td>Pentane</td>
<td>HTP 8h</td>
<td>800 ppm 1900 mg/m³</td>
<td>Finland. Occupational Exposure Limits 05/2012</td>
</tr>
<tr>
<td>Pentane</td>
<td>HTP 15min</td>
<td>630 ppm 1900 mg/m³</td>
<td>Finland. Workplace Exposure Limits(2009)</td>
</tr>
<tr>
<td>Pentane</td>
<td>HTP 8h</td>
<td>500 ppm 1500 mg/m³</td>
<td>Finland. Workplace Exposure Limits(2009)</td>
</tr>
</tbody>
</table>

### DNEL-values

<table>
<thead>
<tr>
<th>Critical ingredient</th>
<th>Type</th>
<th>Value</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pentane</td>
<td>Workers - by inhalation, systemic, long-term</td>
<td>3000 mg/m³</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Workers - dermal, systemic, long-term</td>
<td>432 mg/kg bw/day</td>
<td></td>
</tr>
<tr>
<td>1,1,1,2-Pentafluoroethane</td>
<td>Workers - by inhalation, systemic, long-term</td>
<td>16444 mg/m³</td>
<td>(Repeated dose toxicity)</td>
</tr>
<tr>
<td>1,1,1,2-Tetrafluoroethane</td>
<td>Workers - by inhalation, systemic, long-term</td>
<td>13936 mg/m³</td>
<td></td>
</tr>
</tbody>
</table>

### PNEC-values

<table>
<thead>
<tr>
<th>Critical ingredient</th>
<th>Type</th>
<th>Value</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pentane</td>
<td>Aquatic (freswater)</td>
<td>230 µg/l</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Soil</td>
<td>0,55 mg/kg</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Sediment (marine water)</td>
<td>1,2 mg/kg</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Sewage treatment plant</td>
<td>3600 µg/l</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Sediment (fresh water)</td>
<td>1,2 mg/kg</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Aquatic (marine water)</td>
<td>230 µg/l</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Aquatic (intermit. releases)</td>
<td>880 µg/l</td>
<td>-</td>
</tr>
</tbody>
</table>
8.2 Exposure controls

Appropriate engineering controls
- Consider a work permit system e.g. for maintenance activities.
- Ensure adequate ventilation including exhaust ventilation to ensure that the specified exposure limit value is not exceeded.
- Systems under pressure should be regularly checked for leakages.
- Preferably use permanent leak tight connections (e.g. welded pipes).
- Do not eat, drink or smoke when using the product.

Individual protection measures like personal protective equipment

General information: A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk. The following recommendations should be considered. Keep self contained breathing apparatus readily available for emergency use. Personal protective equipment for the body should be selected based on the task being performed and the risks involved.

Eye and face protection
To avoid exposure to liquid splashes, safety glasses, eye protection or face shields should be used in accordance with EN 166.
(Instructions: EN 166 Personal Eye Protection.)

Skin protection: read Eye and face protection and Hand protection instructions here before and after this text.

Hand protection: Wear working gloves while handling containers. (Guidelines: EN 388 Protective gloves against mechanical risks)

Body protection: No special precautions.

Other: Wear safety shoes while handling containers.

Respiratory protection: Not required.

Thermal hazards: Not precautionary measures are necessary.
Hygiene measures: Specific risk management measures are not required beyond good industrial hygiene and safety procedures. Do not eat, drink or smoke when using the product.

Environmental exposure controls: Waste disposal, see sec. 13.

### SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

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

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance, physical state, form and color</td>
<td>Gas, liquefied gas, colorless.</td>
</tr>
<tr>
<td>Odor</td>
<td>Gasoline-like or natural gas odor, faint ethereal</td>
</tr>
<tr>
<td>Odor threshold</td>
<td>Subjective and inadequate to warn of over exposure.</td>
</tr>
<tr>
<td>pH</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Melting point</td>
<td>No data available.</td>
</tr>
<tr>
<td>Boiling point</td>
<td>No data available.</td>
</tr>
<tr>
<td>Critical temperature (°C)</td>
<td>No data available.</td>
</tr>
<tr>
<td>Flash point</td>
<td>No data available.</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>Not applicable to gases and gas mixtures.</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>Not applicable to gases and gas mixtures.</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>This product is not flammable, non-flammable gas.</td>
</tr>
<tr>
<td>Vapor pressure at 25 °C</td>
<td>No reliable data available.</td>
</tr>
<tr>
<td>Critical pressure 25 °C</td>
<td>&quot;</td>
</tr>
<tr>
<td>Vapor density (air=1), 15 °C</td>
<td>3.65 (calculated)</td>
</tr>
<tr>
<td>Solubility (-ies), 25 °C</td>
<td>No data available.</td>
</tr>
<tr>
<td>Partition coefficient, n-oktanol/water</td>
<td>Not known.</td>
</tr>
<tr>
<td>Autoignition temperature</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>Not known.</td>
</tr>
<tr>
<td>Viscosity, kinematic / dynamic</td>
<td>No data available.</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Oxidizing properties</td>
<td>Not applicable.</td>
</tr>
</tbody>
</table>
9.2 Other information

Gas/vapour is heavier than air. May accumulate in confined spaces, particularly at or below ground level.

SECTION 10: STABILITY AND REACTIVITY

10.1 Reactivity

No reactivity hazard other than the effects described in sub-section below.

10.2 Chemical stability

Stable under normal conditions.

10.3 Possibility of hazardous reactions

None.

10.4 Conditions to avoid

Open flames and high energy ignition sources. The product is not flammable in air under ambient conditions of temperature and pressure. When pressurised with air or oxygen, the mixture may become flammable. Certain mixtures of HCFCs or HFCs with chlorine may become flammable or reactive under certain conditions.

10.5 Incompatible materials

No reactions with any common material in dry or wet conditions.

Alkali metals. Alkaline earth metals. Chemically active metals such as lime, powdered aluminum, zinc and magnesium > 2% can react strongly.

10.6 Hazardous decomposition products

Under normal conditions of storage and use hazardous decomposition products should not be produced. Fluoride of hydrogen for thermal decomposition and hidrolysis.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

General information: None.

Acute toxicity / Oral

Product: Based on the available data, the classification criteria are not met.

Component: Pentane: LD 50(Rat): > 2.000 mg/kg
Remarks: Experimental result, Key study

Acute toxicity / Dermal

Product: Based on the available data, the classification criteria are not met.

Acute toxicity / Inhalation
Based on the available data, the classification criteria are not met.
Component: Pentane: LC 50(Rat, 4 h): > 25,3 mg/l
Remarks: Vapor Read-across based on grouping of substances (category approach), Key study.

Repeated dose toxicity
Components:

Pentane: NOAEL(Rat, Inhalation): 30 mg/l
Inhalation Read-across based on grouping of substances (category approach), Key study

Butane: NOAEL(Rat(Female, Male), Inhalation, >= 42 d): 16.000 ppm(m)
Inhalation Experimental result, Key study

Pentafluoroethane: NOAEL (No Observed Adverse Effect Level) (Rat(female, male), inhalation, 13 wk): ≥ 50.000 ppm(m), Inhalation experimental result, main study

Norflurane: NOAEL (No Observed Adverse Effect Level) (Rat(male), inhalation, 14d): 100.000 ppm(m) Inhalation experimental result, support research

Skin corrosion / irritation
Product: Based on available data, the classification criteria are not met
Component: Pentane: in vivo (Rabbit): Not classified as an Irritant
Experimental result, Key study.

Serious eye damage / eye irritation
Product: Based on the available data, the classification criteria are not met.
Component: Pentane: in vivo (Rabbit, 48 hrs): Not irritating
OECD GHS

Respiratory or skin sensitization
Product: Based on the available data, the classification criteria are not met.

Germ cell mutagenicity
Product: Based on the available data, the classification criteria are not met.

Carcinogenicity
Product: Based on the available data, the classification criteria are not met.

Reproductive toxicity
Product: Based on the available data, the classification criteria are not met.

Specific target organ toxicity – single exposure
Product: Based on the available data, the classification criteria are not met.

Specific target organ toxicity – repeated exposure
Product: Based on the available data, the classification criteria are not met.

Aspiration hazard
Product: Based on the available data, the classification criteria are not met.
Other relevant toxicity information

Norflurane
Cardiac sensitisation threshold limit 40000 ppm, Beagle (dog) NOAEC, Cardiac sensitisation threshold limit 80000 ppm, Beagle (dog) LOAEC

Pentafluoroethane
Cardiac sensitisation threshold limit 10000 ppm, Beagle (dog) NOAEC, Cardiac sensitisation threshold limit 75000 ppm, Beagle (dog) LOAEC

- Light hydrocarbons have been associated with cardiac sensitization in abuse situations.
- Hypoxia or the injection of adrenaline-like substances enhances effects.
- May produce irregular heart beat and nervous symptoms.

SECTION 12: ECOLOGICAL INFORMATION

12.1 Toxicity

Acute toxicity, Product: No ecological damage caused by this product.

Acute toxicity – Fish:
Component information

Pentane: LC 50 (Oncorhynchus mykiss, 96 h): 4.26 mg/l (Static renewal) Remarks: Experimental result, Supporting study

Butane: LC 50 (Different kind, 96h): 147.54 mg/l (QSAR) Notes: QSAR, main study

Pentafluoroethane: LC 50 (Oncorhynchus mykiss, 96 h): 450 mg/l (semi-static). Notes: Similarities with similar substance (structural similarity or substitute), evidence-based study.

Norflurane: LC50 / 96 h / Oncorhynchus mykiss (rainbow trout): 450 mg/l (semi-static), experimental result, main study.

Acute toxicity – Aquatic invertebrates:
Component information

Pentane: EC 50 (Daphnia magna, 48 h): 9.1 mg/l (Static) Remarks: Experimental result, Supporting study EC 50 (Water flea (Daphnia magna), 48 h): 2.7 mmol/m3

Butane: LC50 (Daphnid, 48h): 14.22 mg/l (QSAR), notes: QSAR, main study

Pentafluoroethane: EC 50 (Daphnia magna, 48h): > 200 mg/l (static). Notes: Similarities with similar substance (structural similarity or substitute), evidence-based study.

Norflurane: EC 50 (Daphnia magna, 24h): 960 mg/l (static), experimental result, main study.
Chronic toxicity, aquatic invertebrates

Component information

**Pentane:** NOAEL (Daphnia magna, 21 d): 10.76 mg/l (QSAR) QSAR, Key study

**Pentafluoroethane:** EC (16d): 12 mg/l

Toxicity to aquatic plants:

Component information

**Pentane:**
- EC 50 (Green algae (Selenastrum capricornutum), 72 h): 10.7 mg/l
- NOEC (Green algae (Selenastrum capricornutum), 72 h): 2.04 mg/l

**Butane:**
- LC 50 (Algae, 72h): 7.7 mg/l

**Pentafluoroethane:** EC 50 (Green algae, 72h): 142 mg/l

### 12.2 Persistence and degradability

Product: Not applicable to gases and gas mixtures.

**Photodegradation**, Component information: Pentane: Non-significant photolysis.

**Stability in water**, Component information: 87% Non-significant hydrolysis.

### 12.3 Bioaccumulative potential

Product: This product is expected to biodegrade and is not expected to persist for long periods in an aquatic environment.

**Bioconcentration Factor (BCF)**, Component information: Pentane:
- *Pimephales promelas*, Bioconcentration Factor (BCF): 171 Aquatic sediment QSAR, Key study.

### 12.4 Mobility in soil

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

**Pentane**: Henry’s Law Constant: 7.010 MPa (25 °C)

**Norflurane**: Henry’ Law Constant: 8.580 MPa (25 °C)

### 12.5 Results of PBT and vPvB

Not classified as PBT or vPvB.

### 12.6 Other adverse effects

Global Warming Potential: 1805.1. Contains fluorinated greenhouse gases. Release of large quantities into the atmosphere may contribute to the greenhouse effect.

Contains fluorinated greenhouse gases When discharged in large quantities may contribute to the greenhouse effect. For GWP value of mixture and quantities, refer to container label.
SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

**General information:**
Do not discharge into any place where its accumulation could be dangerous. Consult supplier for specific recommendations.
Do not discharge into areas where there is a risk of forming an explosive mixture with air.
Waste gas should be flared through a suitable burner with flash back arrestor.

**Disposal methods**
Refer to the EIGA code of practice (Doc.30 "Disposal of Gases", http://www.eiga.org) for more guidance on suitable disposal methods. Dispose of container via supplier only. Discharge, treatment, or disposal may be subject to national, state, or local laws.

**European Waste Codes:**
Container: 14 06 01*: chlorofluorocarbons, HCFC, HFC.


SECTION 14: TRANSPORT INFORMATION, ADR 2015 ja RID 2015, IMDG 37-14, IATA/ICAO 2015

14.1 **UN Number**
UN 1078

14.2 **UN proper shipping name**
LIQUEFIED GAS, N.O.S.(1,1,1,2-Tetrafluoroethane, Pentafluoroethane)

14.3 **Transport hazard class**
2 (IMDG 2.2), Labels 2.2, Hazard nr (ADF) 20, EmS No: F-C, S-V

14.4 **Packing Group**
-

14.5 **Environmental hazards**
Marine pollutant: No.

14.6 **Special Precautions fo Users**
ADR-Tunnel restriction code C/E.
IMDG-EmS No: F-C, S-V
Passenger and cargo aircraft: Allowed.
Cargo aircraft only: Allowed.

### 14.7 Transport in bulk according to Annex II of MARPOL and the IBC Code

Not applicable.

**Additional identification:**

- 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 that they are firmly secured.
- Ensure that the container valve is closed and not leaking.
- Container valve guards or caps should be in place.
- Ensure adequate air ventilation.

## SECTION 15: REGULATORY INFORMATION

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

**EU Regulations No. 1907/2006 Annex XVII Substances subject to restriction on marketin and use:**

Pentane, Cas No 109-66-0, concentration 0,1 - 1,0%

**Directive 92/85/EEC: on the safety and health of pregnant workers and workers who have recently given birth or are breast feeding:**

Pentane, Cas No 109-66-0, concentration 0,1 - 1,0%

**Directive 96/82/EC (Seveso III): on the control of major accident hazards involving dangerous substances:**

Butane, Cas No 106-97-8, concentration 1,0 – 10%

Pentane, Cas No 109-66-0, 0,1 – 1,0%

**Directive 98/24/EC on the protection of workers from the risks related to chemical agents at work:**

Butane, Cas No 106-97-8, 1,0 – 10%

Pentane, Cas No 106-66-0, 0,1 – 1,0%

**Council Directive 96/82 / EEC on he introduction of measures to encourage improvements in the safety and health of workers at work Directive 89/686/EEC on personal protective equipment Only products that comply with the food regulations (EC) No. 1333/2008 and (EU) No. 231/2012 and are labelled as such may be used as food additives.**

This Safety Data Sheet has been produced to comply with Regulation (EU) 2015/830.

**National regulations:**

- Only products that comply with the food regulations (EC) No. 1333/2008 and (EU) No. 231/2012 and are labelled as such may be used as food additives.
This Safety Data Sheet has been produced to comply with Regulation (EU) 2015/830.

Other legislation:
- Chemicals Act 599/2013
- Chemical Regulation 675/1993
- Security seal for the cover and danger symbol for the visually impaired 414/2011
- Regulation on the names of substances 5/2010, amendment 1123/2010
- Government Decree on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain paints and varnishes and vehicle refinishing products 837/2005.
- Government Decree on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain activities and installations 435/2001, as amended
- Waste Act 646/2011
- Concentrations known as harmful 268/2014

15.2 Chemical safety assessment

No Chemical Safety Assessment has been carried out.

SECTION 16: OTHER INFORMATION

Revision information: no relevant

Data sources of this SDS

Safety Data Sheet provided by the manufacturer.

Legislation on hazardous chemicals valid at the time of writing.


European Chemicals Agency, Information on registered substances.

International Programme on Chemical Safety.

WWW-SOURCES

echa.europa.eu
eiga.org
esis.jrc.ec.europa.eu
eur-lex.europa.eu
atsdr.cc.gov

www.lvm.fi/en/home
http://www.who.int/ipcs/en/
www.ericards.net
Rating methods of classification


Precautionary, Wording of the H-statements in section 2 and 3
H224 Extremely flammable liquid and vapor.
H280 Contains gas under pressure, may explode on heating.
H304 May be fatal if swallowed and enters airways.
H336 May cause drowsiness or dizziness.
H411 Toxic to aquatic life with long lasting effects.

Classification according to Regulation (EC) No 1272/2008 as amended
Press. Gas Liq. Gas, H280

Training information
It is recommended that persons handling the product have minimum training in the prevention and protection of work-related hazards. This makes it easier to understand and interpret the safety data sheet and product labels. Users of breathing apparatus must be trained. Ensure all operators understand the flammability hazard.

Other information
Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out. Ensure adequate air ventilation. Ensure all national/local regulations are observed. Ensure equipment is adequately earthed. Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted. ASHRAE: A2L

Disclaimer:
This information is provided without warranty. The data is trusted to be flawless. This information should be used to make an independent determination of the practices that protect workers and the environment.

The information contained in this MSDS is based on sources, scientific and technical knowledge, existing national and EU legislation.

The release is intended to serve the safe use of the product. We do not know or control the working methods or conditions of the users of the product. The user is always ultimately responsible for taking measures to ensure compliance with the regulations in force in the handling, storage, use and disposal of chemicals.

In this context, it is noted that the information provided in the SDS also helps employers to fulfill their obligations under Directive 98/24 / EU10 on the protection of the health and safety of workers from the risks related to chemical agents at work.

On the basis of the safety data sheet, users should be able to take the necessary measures in the field of health and safety to ensure safety and protect the environment.
Product name / chemical name: R437A / C5H12 8624,4816 PPM; C4H10 2,4980 %; C2HFS 16,8495 %; C2H2F4 79,7900 %

SDS according to setting: EU 2015/830

The Safety Data Sheet is provided for in Article 31 of REACH Regulation (EU) No 1907/2006 and in Annex II to the Regulation.