

**R-438A**
**100043800**
**SECTION 1 Identification of the substance/mixture and of the company/undertaking**
**1.1. Product identifier**

Trade name : R-438A

**1.2. Relevant identified uses of the substance or mixture and uses advised against**
**1.2.1 Relevant identified uses** : Refrigerant

**1.3. Details of the supplier of the safety data sheet**

 : DEHON SERVICE  
 26 Avenue du Petit Parc  
 94683 VINCENNES Cedex France  
 Tel : +33 (0) 1 43 98 75 00  
 Fax : +33 (0) 1 43 98 21 51

e-mail : ContactFDS@climalife.dehon.com

**1.4 Emergency telephone number** : EMERGENCY TELEPHONE NUMBER (24h/24) : + 33 (0) 1 72 11 00 03  
 Anti-poison Center : INRS/ORFILA (France) : +33 (0) 1 45 42 59 59  
 Anti-poison Centre (Belgium) : +32 70 245 245  
 Anti-poison Centre (Netherlands) : +31 30 274 8888  
 Anti-poison Centre (Spain) : +34 91 562 04 20  
 Anti-poison Centre (United Kingdom) : +44 870 600 6266  
 Poisons Information Centre (Hungary) : +36 80 201 199

**SECTION 2 Hazards identification**
**2.1. Classification of the substance or mixture**
**2.1.1. Regulation (EC) No 1272/2008 (CLP)**
**Physical hazards** : Gases under pressure - Liquefied gas (Press. Gas) - H280

**2.1.2 Directive EEC/67/548 or 1999/45/CE** : This product is not classified as a "hazardous preparation" according to European Community regulations

**2.2. Label elements**
**2.2.1 Labelling EC 1272/2008 (CLP)**
**Hazard pictograms**

**Signal words** : Warning

**Hazard statements** : H280 : Contains gas under pressure; may explode if heated

**Precautionary statements :**

 • **Storage** : P410 + P403 : Protect from sunlight. Store in a well-ventilated place

 \* **- Further data** : Contains : 45% R-134a / 44.2% R-125 / 8.5% R-32  
 Greenhouse fluorinated gas falling within Kyoto Protocol  
 (GWP = 2265)

**2.3. Other hazards**
**Adverse human health effects** : Suffocation hazard by lack of oxygen  
 Contact with liquid may cause frostbite and serious damage to eyes

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**R-438A**
**100043800**
**SECTION 3 Composition/information on ingredients**
**3.1./3.2. Substance / Preparation** : Preparation

**Components contributing to the hazard :**

Substance name	Contents	CAS No	EC No	Index No	Ref REACH	Classification
Pentafluoroethane	: 45 %	354-33-6	206-557-8	-----	01-2119485636-25	Not classified. (DSD/DPD) Liquefied gas;H280
1,1,1,2-Tetrafluoroethane	: 44.2 %	811-97-2	212-377-0	-----	01-2119459374-33	Not classified. (DSD/DPD) Liquefied gas;H280
Difluoromethane	: 8.5 %	75-10-5	200-839-4	-----	01-2119471312-47	F+; R12 Flam. Gas 1;H220 Liquefied gas;H280
n-Butane	: 1.7 %	106-97-8	203-448-7	601-004-00-0	01-2119474691-32	F+; R12 Flam. Gas 1;H220 Liquefied gas;H280
Isopentane	: 0.6 %	78-78-4	201-142-8	601-006-00-1	01-2119475602-38	F+; R12 Xn; R65 R66 R67 N; R51-53 Flam. Liq. 1;H224 Asp. Tox. 1;H304 STOT SE3; H336 EUH066 Aquatic Chronic 2;H411

**SECTION 4 First aid measures**
**4.1. Description of first aid measures**

- Inhalation** : Move the affected person away from the contaminated area and into the fresh air  
If the person feels unwell : Call a doctor
- Skin contact** : Immediately remove contaminated clothing or footwear  
Immediately rinse with plenty of water  
In the event of contact with the liquid: treat resulting frostbite as a burn  
If skin burns appear, call a doctor immediately
- Eye contact** : Rinse immediately and thoroughly, pulling the eyelids well away from the eye (15 minutes minimum)  
Consult an eye specialist immediately
- Ingestion** : Not specifically applicable (gas)

**4.2. Most important symptoms and effects, both acute and delayed**

- Inhalation** : Narcotic effect  
Headaches  
Cardiac disorders  
Dizziness

- \* **Skin contact** : Rapid evaporation of the liquid may cause frostbite
- \* **Eye contact** : May cause eye irritation.
- \* **Ingestion** : Not applicable.

- 4.3. Indication of any immediate medical attention and special treatment needed** : No information available

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# MATERIAL SAFETY DATA SHEET

Page : 3 / 9

Version : 2

Date : 26 / 5 / 2015

Supersedes : 6 / 11 / 2014

**R-438A**

**100043800**

## SECTION 5 Fire-fighting measures

### 5.1. Extinguishing media

**Suitable extinguishing media** : All extinguishing agents can be used

**Unsuitable extinguishing media** : None to our knowledge. If there is a fire close by, use suitable extinguishing agents

### 5.2. Special hazards arising from the substance or mixture

**Specific hazards** : Pressurized container. On heating there is a risk of bursting due to internal pressure build-up.  
On heating : Toxic and corrosive vapours are released

### 5.3. Advice for firefighters

**Specific fire fighting methods** : Cool down the containers exposed to heat with a water spray

**Protection of fire-fighters** : Complete protective clothing  
Self-contained breathing apparatus

## SECTION 6 Accidental release measures

**6.1. Personal precautions, protective equipment and emergency procedures** : Evacuate the danger area.  
Only qualified personnel equipped with suitable protective equipment may intervene  
Ensure that there is a suitable ventilation system  
Stop the leak.  
Prevent the product from entering cellars, basements or pits

**6.2. Environmental precautions** : Contain the spilled material by bunding

**6.3. Methods and material for containment and cleaning up** : Recover as much product as possible  
Mechanically ventilate the spillage area (risk of asphyxia)

\* **6.4 Reference to other sections** : For further information refer to section 8 "Exposure controls/personal protection"

## SECTION 7 Handling and storage

### 7.1. Precautions for safe handling

**Technical measures** : Ventilation

**Precautions** : Avoid contact with skin and eyes  
Do not breathe vapour  
Avoid contact with hot surfaces  
Avoid high temperatures.

**Industrial hygiene** : Do not drink, eat or smoke in the workplace

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

**- Recommended** : Store :  
- in a dry, well-ventilated area  
- away from any source of ignition  
- away from any source of heat  
- at temperature not exceeding 52°C

**Incompatible products** : Strong oxidizing agents  
Alkaline earth metals  
Alkali metals  
Metallic powders

**Packaging :** : Pressurized metal container

**Packaging materials**

**- Recommended** : Stainless steel  
Ordinary steel

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**R-438A**
**100043800**
**SECTION 7 Handling and storage (continued)**

- Not suitable : Magnesium and its alloys.  
Plastic materials.  
Zinc and its alloys.  
Alloys containing more than 2% magnesium
- 7.3. Specific end use(s) : No data

**SECTION 8 Exposure controls/personal protection**
**8.1. Control parameters**
**Engineering measures** : Ensure good ventilation of the work station

- 8.1.1. Occupational Exposure Limits** :
- Pentafluoroethane : France : LEP - VME (8h; ppm) : 1000
  - 1,1,1,2-Tetrafluoroethane : United Kingdom : WEL - TWA (8h; mg/m<sup>3</sup>) : 4240
  - 1,1,1,2-Tetrafluoroethane : United Kingdom : WEL - TWA (8h; ppm) : 1000
  - 1,1,1,2-Tetrafluoroethane : Germany : MAK - TWA (8h; mg/m<sup>3</sup>) : 4200
  - 1,1,1,2-Tetrafluoroethane : Germany : MAK - TWA (8h; ppm) : 1000
  - 1,1,1,2-Tetrafluoroethane : Germany : TRK - STEL (15min; mg/m<sup>3</sup>) : 33600
  - 1,1,1,2-Tetrafluoroethane : Germany : TRK - STEL (15min; ppm) : 8000
  - Difluoromethane : France : LEP - VME (8h; mg/m<sup>3</sup>) : 2130
  - Difluoromethane : France : LEP - VME (8h; ppm) : 1000
  - n-Butane : France : LEP - VME (8h; mg/m<sup>3</sup>) : 1900
  - n-Butane : France : LEP - VME (8h; ppm) : 800
  - n-Butane : United Kingdom : WEL - TWA (8h; mg/m<sup>3</sup>) : 1450
  - n-Butane : United Kingdom : WEL - TWA (8h; ppm) : 600
  - n-Butane : United Kingdom : WEL - STEL (15min; mg/m<sup>3</sup>) : 1850
  - n-Butane : United Kingdom : WEL - STEL (15min; ppm) : 750
  - n-Butane : Germany : MAK - TWA (8h; mg/m<sup>3</sup>) : 2400
  - n-Butane : Germany : MAK - TWA (8h; ppm) : 1000
  - n-Butane : Germany : MAK - STEL (15min; mg/m<sup>3</sup>) : 9600
  - n-Butane : Germany : MAK - STEL (15min; ppm) : 4000
  - n-Butane : Hungary : AK - TWA (8h; mg/m<sup>3</sup>) : 2350
  - n-Butane : Hungary : AK - STEL (15min; mg/m<sup>3</sup>) : 9400
  - n-Butane : USA (NIOSH) : REL - TWA (8h; mg/m<sup>3</sup>) : 1900
  - n-Butane : USA (NIOSH) : REL - TWA (8h; ppm) : 800
  - Isopentane : European Union : VME (8h; mg/m<sup>3</sup>) : 3000
  - Isopentane : European Union : VME (8h; ppm) : 1000
  - Isopentane : France : LEP - VME (8h; mg/m<sup>3</sup>) : 3000
  - Isopentane : France : LEP - VME (8h; ppm) : 1000
  - Isopentane : United Kingdom : WEL - TWA (8h; mg/m<sup>3</sup>) : 1800
  - Isopentane : United Kingdom : WEL - TWA (8h; ppm) : 600
  - Isopentane : Germany : MAK - TWA (8h; mg/m<sup>3</sup>) : 3000
  - Isopentane : Germany : MAK - TWA (8h; ppm) : 1000
  - Isopentane : Germany : MAK - STEL (15min; mg/m<sup>3</sup>) : 6000
  - Isopentane : Germany : MAK - STEL (15min; ppm) : 2000
  - Isopentane : Hungary : AK - TWA (8h; mg/m<sup>3</sup>) : 3000
  - Isopentane : Netherlands : MAC - TWA (8h; mg/m<sup>3</sup>) : 1800
  - Isopentane : Belgium : GWBB - TWA (8h; mg/m<sup>3</sup>) : 1800
  - Isopentane : Belgium : GWBB - TWA (8h; ppm) : 600
  - Isopentane : Belgium : GWBB - STEL (15min; mg/m<sup>3</sup>) : 2250
  - Isopentane : Belgium : GWBB - STEL (15min; ppm) : 750
  - Isopentane : Switzerland : LEP - VME (8h; mg/m<sup>3</sup>) : 1800
  - Isopentane : Switzerland : LEP - VME (8h; ppm) : 600
  - Isopentane : Switzerland : LEP - VLE (15min; mg/m<sup>3</sup>) : 3600
  - Isopentane : Switzerland : LEP - VLE (15min; ppm) : 1200

**Personal protection :**
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**R-438A**
**100043800**
**SECTION 8 Exposure controls/personal protection (continued)**

- Respiratory protection : In the event of insufficient ventilation: Mask with AX canister  
In a confined area : Self-contained breathing apparatus (ARI)
- Hand protection : Leather or nitrile-rubber protective gloves
- Eye protection : Safety spectacles with side shields
- Skin protection : Majority cotton clothing

**SECTION 9 Physical and chemical properties**
**9.1. Information on basic physical and chemical properties**
**9.1.a. Appearance**
**Physical state** : Liquefied gas

**Colour** : Colourless

**9.1.b. Odour** : slightly ethereal.

**9.1.c. Odour threshold** : No information available

**9.1.d. pH** : Not applicable

**9.1.e. Melting point / Freezing point** : No data

**9.1.f. Initial boiling point - boiling range** : -42.3 °C

**9.1.g. Flash point** : Not applicable

**9.1.h. Evaporation rate** : No data

**9.1.i. Flammability** : Non flammable.

**9.1.j. Explosion limits (lower - upper)** : None.

**9.1.k. Vapour pressure** : 9.7 bar at 20 °C  
20.8 bar at 50 °C

**9.1.l. Vapour density** : 3.5 at 25°C

**9.1.m. Density** : Liquid : 1.15 g/cm<sup>3</sup> at 25 °C

**9.1.n. Solubility**

-in water : Slightly soluble

**9.1.o. Partition coefficient : n-octanol / water** : No specific data

**9.1.p. Auto-ignition temperature** : No data

**9.1.q. Thermal decomposition** : No data

 \* **9.1.r. Viscosity** : Not applicable

**9.1.s. Explosive Properties** : Not explosive material according to EC criteria

**9.1.t. Oxidising properties** : Non oxidizing material according to EC criteria

**9.2. Other information**
**Critical temperature :** : 85.27 °C

**Critical pressure :** : 43.0 bar absolute

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**R-438A**
**100043800**
**SECTION 10 Stability and reactivity**

- 10.1. Reactivity : None under normal conditions
- 10.2. Chemical stability : Stable at ambient temperature and under normal conditions of use
- 10.3. Possibility of hazardous reactions : No information available
- 10.4. Conditions to avoid : May decompose :  
- on contact with hot surfaces and flames
- 10.5. Incompatible materials : - alkaline earth metals.  
- alkali metals  
- strong oxidizing agents  
- finely divided metals (Al, Mg, Zn)
- 10.6. Hazardous decomposition products : Carbon oxides (CO, CO<sub>2</sub>)  
Fluorinated hydrocarbons  
Carbonyl halogenides  
Hydrogen halogenides

**SECTION 11 Toxicological information**

- 11.1. Information on toxicological effects
- Acute toxicity
- On ingredients
- n-Butane : Rat inhalation LC50 [mg/l/4h] : 658
- Pentafluoroethane : Rat inhalation LC50 [ppm/4h] : 800000
- Difluoromethane : Rat inhalation LC50 [mg/l/4h] : 2158
- Isopentane : Rat oral LD50 [mg/kg] : 2000  
: Rat inhalation LC50 [mg/l/4h] : 25.3 (Vapours).
- 1,1,1,2-Tetrafluoroethane : Rat inhalation LC50 [ppm/4h] : > 500000
- Skin corrosion/irritation : No information available
  - Serious eye damage/irritation : No information available
  - Respiratory or skin sensitisation : No information available
  - Germ cell mutagenicity : No information available
  - Carcinogenicity : No information available
  - Reproductive toxicity : No information available
  - STOT-single exposure : No information available
  - STOT-repeated exposure : No information available
  - Aspiration hazard : No information available
- Other information : Contact with liquefied gas may cause severe ocular lesions  
Contact with liquefied gas may cause frostbite.

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# MATERIAL SAFETY DATA SHEET

Page : 7 / 9

Version : 2

Date : 26 / 5 / 2015

Supersedes : 6 / 11 / 2014

**R-438A****100043800**

## SECTION 12 Ecological information

### 12.1. Toxicity

#### Effects on the aquatic environment

##### On ingredients

###### n-Butane

: 48 Hour - EC50 - Daphnia magna [mg/l] : 14.22

: 96 Hours - LC50 - Fish [mg/l] : 24.11

###### Pentafluoroethane

: 48 Hour - EC50 - Daphnia magna [mg/l] : 100 (Results obtained on a similar product).

: 72 Hours - EC50 - Algae [mg/l] : 114 (Results obtained on a similar product).

: 96 Hours - LC50 - Fish [mg/l] : 100 (Results obtained on a similar product).

###### Isopentane

: 48 Hour - EC50 - Daphnia magna [mg/l] : 2.3

: 96 Hours - LC50 - Fish (Oncorhynchus mykiss) [mg/l] : 4.26

###### 1,1,1,2-Tetrafluoroethane

: 6 Hours - EC50 - Bacteria (Methanogens) [mg/l] : &gt; 730

: 48 Hour - EC50 - Daphnia magna [mg/l] : 930

: 96 Hours - LC50 - Fish [mg/l] : 450

### 12.2. Persistence and degradability

#### Biodegradability

: R-134a : 3 % biodegradation after 28 days

Not readily biodegradable

Butane (R600) : 100 % biodegradation after 34 days

Readily biodegradable

Isopentane (R601a) : 71.4 % biodegradation after 28 days

Readily biodegradable

\* 

### 12.3. Bioaccumulative potential

 : Not potentially bioaccumulable.

#### Octanol/water partition coefficient

: R-134a : 1.06

R-125 : 1.48

### 12.4. Mobility in soil

#### Volatility

: Product is volatile from an aqueous solution

### 12.5. Results of PBT and vPvB assessment

: No information available

### 12.6. Other adverse effects

#### Ozone depletion potential

: ODP (R-11=1)=0

#### Greenhouse effect

: GWP (CO2=1/100 years) = 2265

## SECTION 13 Disposal considerations

### 13.1. Waste treatment methods

#### WASTE FROM PRODUCT :

##### Prohibition :

: Do not allow the product to be released into the environment

##### Destruction/Disposal

: Consult the manufacturer or supplier for information regarding recovery and recycling of the product

If recovery is not possible:

Incinerate at a licensed installation.

#### CONTAMINATED PACKAGING :

##### Destruction/Disposal

: Return to the supplier

#### NOTE

: The user's attention is drawn to the possible existence of specific european, national or local regulations regarding disposal

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**R-438A**
**100043800**
**SECTION 14 Transport information**

- 14.1. UN number** : UN 3163  
**14.2. UN proper shipping name** : LIQUEFIED GAS, N.O.S. (Pentafluoroethane, 1,1,1,2-Tetrafluoroethane, Difluoromethane , n-Butane , Isopentane)  
**14.3. Transport hazard class(es)**  
**Rail/road (RID/ADR)** : Class : 2  
**Sea transport** : Class : 2.2  
**Air transport (OACI/IATA)** : Class : 2.2  
**Hazard Label(s)** : 2.2



- 14.4. Packing group** : Not applicable  
**14.5. Environmental hazards** : Not classified as dangerous to the aquatic environment  
 Marine pollutant : NO  
**14.6. Special precautions for user**  
**Rail/road (RID/ADR)** : Tunnel restriction code : (C/E)  
 Hazard identification number : 20  
 Classification code : 2A  
**Sea transport** : Segregation group : -  
 Emergency schedule (EmS) : F-C, S-V  
**Air transport (OACI/IATA)** : Cargo aircraft:  
 Packing instruction: 200  
 Quantity: 150 kg  
 Passenger aircraft:  
 Packing instruction: 200  
 Quantity: 75 kg  
**14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code**

**SECTION 15 Regulatory information**

- 15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture** : Ensure all national/local regulations are observed.  
**France** : Classified Installations : applicable  
**REGULATION EC No 842/2006** : Contains : Greenhouse fluorinated gas falling within Kyoto Protocol  
**15.2. Chemical safety assessment** : No information available

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# MATERIAL SAFETY DATA SHEET

Page : 9 / 9

Version : 2

Date : 26 / 5 / 2015

Supersedes : 6 / 11 / 2014

**R-438A****100043800**

## SECTION 16 Other information

<b>Further information</b>	: Product for industrial use only For more information regarding the use of this product, please refer to our technical information or contact the sales department in your region This safety data sheet has been written in conformity with the regulation (UE) 453/2010.
<b>Text of R-Phrases in § 3</b>	: R12 : Extremely flammable. R51/53 : Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. R65 : Harmful : may cause lung damage if swallowed R66 : Repeated exposure may cause skin dryness or cracking R67 : Vapours may cause drowsiness and dizziness.
<b>Text of H-Phrases in § 3</b>	: EUH066 - Repeated exposure may cause skin dryness or cracking H220 - Extremely flammable gas H224 - Extremely flammable liquid and vapour H280 - Contains gas under pressure; may explode if heated H304 - May be fatal if swallowed and enters airways H336 - May cause drowsiness or dizziness H411 - Toxic to aquatic life with long lasting effects
<b>* Update</b>	: Modifications are indicated by an asterisk (*)

This sheet complements the technical sheets but does not replace them. The information given is based on our knowledge of the product, at the time of publication. It is given in good faith.

Besides, the attention of the user is drawn to the possible risks incurred by using the product for any other use than that for which it was intended.

In no way does this exempt the user from knowing and applying all the regulations controlling his activity. He alone will take on the responsibility for taking the precautions involved by the use of the product.

The aim of all the mandatory regulations mentioned is just to help the user to fulfil his obligations regarding the use of hazardous products.

This information must not be considered exhaustive. It does not exempt the user from ensuring that other obligations than those mentioned could apply, related to the storage and use of the product, this being his sole responsibility.

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