

**Solstice® N40 (R-448A)**
**100144800**
**SECTION 1 Identification of the substance/mixture and of the company/undertaking**
**1.1. Product identifier**

Trade name : Solstice® N40 (R-448A)

**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 :  
 26% 1,1-Difluoromethane (R-32) / 26% Pentafluoroethane (R-125) / 21% 1,1,1,2-Tetrafluoroethane (R-134a) / 20% 2,3,3,3-Tetrafluoroprop-1-ene (R-1234yf) / 7% Trans-1,3,3,3-Tetrafluoroprop-1-ene (R-1234ze)  
 Greenhouse fluorinated gas falling within Kyoto Protocol (GWP = 1387)

**2.3. Other hazards**

 : Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing  
 Contact with liquid may cause frostbite and serious damage to eyes

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## 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
Difluoromethane	: 26 %	75-10-5	200-839-4	-----	01-2119471312-47	F+; R12 ----- Flam. Gas 1;H220 Liquefied gas;H280
Pentafluoroethane	: 26 %	354-33-6	206-557-8	-----	01-2119485636-25	Not classified. (DSD/DPD) ----- Liquefied gas;H280
1,1,1,2-Tetrafluoroethane	: 21 %	811-97-2	212-377-0	-----	01-2119459374-33	Not classified. (DSD/DPD) ----- Liquefied gas;H280
2,3,3,3-Tetrafluoroprop-1-ene	: 20 %	754-12-1	468-710-7	-----	01-0000019665-61	F+; R12 ----- Flam. Gas 1;H220 Liquefied gas;H280
Trans-1,3,3,3-Tetrafluoroprop-1-ene	: 7 %	29118-24-9	471-480-0	-----	01-0000019758-54	Not classified. (DSD/DPD) ----- Liquefied gas;H280

## 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  
Call a POISON CENTER/doctor/physician if you feel unwell
- Skin contact** : In the event of contact with the liquid: treat resulting frostbite as a burn  
Rinse with plenty of water. DO NOT remove clothing (since it may stick to the skin).  
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** : Headaches  
Loss of consciousness  
Drowsiness  
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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## SECTION 5 Fire-fighting measures

### 5.1. Extinguishing media

**Suitable extinguishing media** : Water spray  
Carbon dioxide (CO<sub>2</sub>)  
Alcohol resistant foam  
Dry powder

**Unsuitable extinguishing media** : Strong water jet

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

**Specific hazards** : 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** : Avoid contact with skin and eyes  
Do not breathe vapours  
Do not attempt to take action without suitable protective equipment  
Evacuate the danger area.  
Stop the leak.  
Ensure that there is a suitable ventilation system  
Remove all sources of ignition

**6.2. Environmental precautions** : Do not allow product to spread into the environment

**6.3. Methods and material for containment and cleaning up** : Mechanically ventilate the spillage area.

**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

**Precautions** : Work in a well-ventilated area  
Pressurized container . Handle and open container with care.  
Avoid the build-up of electrostatic charge  
Smoking is forbidden

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

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

#### Storage conditions

**- Recommended** : Store :  
- only in the original container  
- in a cool, well-ventilated area  
- the container tightly closed  
- at temperature not exceeding 50 °C  
- away from any source of ignition

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

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## SECTION 7 Handling and storage (continued)

### Packaging materials

- Recommended : Ordinary steel
- Not suitable : 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 :
- Difluoromethane : France : LEP - VME (8h; mg/m<sup>3</sup>) : 2130
  - Difluoromethane : France : LEP - VME (8h; ppm) : 1000
  - 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
  - 2,3,3,3-Tetrafluoroprop-1-ene : TWA [8h; ppm] : 500 (recommended)
  - Trans-1,3,3,3-Tetrafluoroprop-1-ene : TWA [8h; ppm] : 800

### 8.2. Exposure controls

#### Personal protection :

- 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  
Protective gloves made of Viton
- 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 : 1,1-Difluoromethane (R-32) : - 136 °C  
Pentafluoroethane (R-125) : - 103 °C  
1,1,1,2-Tetrafluoroethane (R-134a) : -101 °C

9.1.f. Initial boiling point - boiling range : 1,1-Difluoromethane (R-32) : - 51.6 °C  
Pentafluoroethane (R-125) : - 48.1 °C

9.1.g. Flash point : Not applicable

9.1.h. Evaporation rate : No information available

9.1.i. Flammability : Non flammable.

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**SECTION 9 Physical and chemical properties (continued)**

- 9.1.j. Explosion limits (lower - upper) : None.
- 9.1.k. Vapour pressure : 11.20 bar at 21.1 °C  
25.88 bar at 54.4 °C
- 9.1.l. Vapour density : 41.79 kg/m<sup>3</sup> at 20 °C  
101.24 kg/m<sup>3</sup> at 50 °C
- 9.1.m. Density : Liquid :  
1.11 g/cm<sup>3</sup> at 20 °C  
0.964 g/cm<sup>3</sup> at 50 °C
- 9.1.n. Solubility  
-in water : Slightly soluble
- 9.1.o. Partition coefficient : n-octanol / water : 1,1-Difluoromethane (R-32) : 0.21 (log Pow)  
Pentafluoroethane (R-125) : 1.48 (log Pow)  
1,1,1,2-Tetrafluoroethane (R-134a) : 1.06 (log Pow)  
2,3,3,3-Tetrafluoroprop-1-ene (R-1234yf) : 2.15 (log Pow)  
Trans-1,3,3,3-Tetrafluoroprop-1-ene (R-1234ze) : 1.6 (log Pow)
- 9.1.p. Auto-ignition temperature : No information available
- 9.1.q. Thermal decomposition : No information available
- 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 : -

**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 dangerous polymerization.
- 10.4. Conditions to avoid : - high temperatures, naked flames  
Heating will cause a rise in pressure with a risk of bursting.
- 10.5. Incompatible materials : - strong oxidizing agents  
- alkaline earth metals.  
- Finely divided metals.  
- Alkaline hydroxide
- 10.6. Hazardous decomposition products : On thermal decomposition (pyrolysis), releases :  
Carbon oxides (CO, CO<sub>2</sub>)  
Hydrogen fluoride  
Carbonyl halogenides  
Halogenated compounds.

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**SECTION 11 Toxicological information**
**11.1. Information on toxicological effects**
**• Acute toxicity**
**On ingredients**
**Trans-1,3,3,3-Tetrafluoroprop-1-ene** : Rat inhalation LC50 [mg/l/4h] : > 965

**Pentafluoroethane** : Rat inhalation LC50 [ppm/4h] : 800000

**Difluoromethane** : Rat inhalation LC50 [mg/l/4h] : 2158

**2,3,3,3-Tetrafluoroprop-1-ene** : Rat inhalation LC50 [ppm/4h] : > 400000

**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.

**SECTION 12 Ecological information**
**12.1. Toxicity**
**Effects on the aquatic environment** : The product does not have any known adverse effects on the environment.

**12.2. Persistence and degradability**
**Biodegradability**

 : No easy biodegradable  
 Difluoromethane (R-32) :  
 Water : 5 % biodegradation after 28 days  
 Air : Half-life = 1472 days  
 Pentafluoroethane (R-125) :  
 Water : 5 % biodegradation after 28 days  
 Air : Half-life = 28.3 years (estimated value)  
 1,1,1,2-Tetrafluoroethane (R-134a) :  
 Water : 3 % biodegradation after 28 days

**12.3. Bioaccumulative potential**
**Octanol/water partition coefficient**

 : Practically not bioaccumulable  
 1,1-Difluoromethane (R-32) : 0.21  
 Pentafluoroethane (R-125) : 1.48  
 1,1,1,2-Tetrafluoroethane (R-134a) : 1.06  
 Trans-1,3,3,3-Tetrafluoroprop-1-ene (R-1234ze) : 1.6

**12.4. Mobility in soil**

: No information available

**12.5. Results of PBT and vPvB assessment**

: This mixture contains no substance meeting PBT and vPvB criteria

**12.6. Other adverse effects**
**Ozone depletion potential** : ODP (R-11=1)=0

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**SECTION 12 Ecological information (continued)**
**SECTION 13 Disposal considerations**
**13.1. Waste treatment methods**
**WASTE FROM PRODUCT :**

**Destruction/Disposal** : Consult the manufacturer or supplier for information regarding recovery and recycling of the product

**CONTAMINATED PACKAGING :**

**Destruction/Disposal** : Reuse or recycle following decontamination.  
Destroy at an authorised site

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

**SECTION 14 Transport information**

**14.1. UN number** : UN 3163

**14.2. UN proper shipping name** : LIQUEFIED GAS, N.O.S. (Difluoromethane , Pentafluoroethane, 1,1,1,2-Tetrafluoroethane, 2,3,3,3-Tetrafluoroprop-1-ene, Trans-1,3,3,3-Tetrafluoroprop-1-ene)

**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** : -

**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** : EmS Nr : F-C, S-V  
Segregation group : -

**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**

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## 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** : Greenhouse fluorinated gas falling within Kyoto Protocol

**15.2. Chemical safety assessment** : No information available

## SECTION 16 Other information

**Further information** : 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.

**Text of R-Phrases in § 3** : R12 : Extremely flammable.

**Text of H-Phrases in § 3** : H220 - Extremely flammable gas  
H280 - Contains gas under pressure; may explode if heated

**\* Update** : 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.

**End of document**

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