Solstice® ze (R-1234ze) Safety Data Sheet
according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2015/830
Revision date: 13/07/2018   Supersedes: 02/02/2018   Version: 7.0

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product form: Substance
Name: Solstice® ze (R-1234ze)
Chemical name: Trans-1,3,3,3-Tetrafluoroprop-1-ene
EC-No.: 471-480-0
CAS-No.: 29118-24-9
REACH registration No: 01-0000019758-54
Product code: 101123400

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

1.2.1. Relevant identified uses
Use of the substance/mixture: Refrigerant

1.2.2. Uses advised against
No additional information available

1.3. Details of the supplier of the safety data sheet

Supplier
Dehon Service SA
26 Avenue du Petit Parc
94683 VINCENNES Cedex - France
T 01 43 98 75 00 - F 01 43 98 21 51
ContactFDS@climalife.dehon.com

Other
Climalife Kft Budepesta sucurcala Bucuresti Romania
Bulevardul Hristo Botev, Nr. 28,
Biroul NR 4, Modulul I
Bucuresti Sectorul 3 - Romania
ContactFDS@climalife.dehon.com

Other
Dehon Kälte-Fachvertriebs GmbH
Robert-Bosch-Strasse 14
40668 MEERBUSCH - Germany
T 00 49 2150 7073 0 - F 00 49 2150 7073 17
ContactFDS@climalife.dehon.com

Other
Dehon Service Belgium s.a/n.v.
Avenue Carton de Wiart, 79
1090 Bruxelles - Belgium
T 00 32 2 426 96 62
ContactFDS@climalife.dehon.com

Other
Friogas sa
Poligono Industrial SEPES Parcélia 10
46500 SAGUNTO (Valencia) - Spain
T 00 34 9 6 266 36 32 - F 00 34 9 6 266 50 25
ContactFDS@climalife.dehon.com

Other
Prochimac SA
Rue du Château 10
CH-2000 NEUCHATEL - Switzerland
T 00 41 32 727 36 00 - F 00 41 32 727 36 19
ContactFDS@climalife.dehon.com

1.4. Emergency telephone number

Emergency number: +33 (0) 1 72 11 00 03

<table>
<thead>
<tr>
<th>Country</th>
<th>Organisation/Company</th>
<th>Address</th>
<th>Emergency number</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>United Kingdom</td>
<td>National Poisons Information Service (Birmingham Centre) City Hospital</td>
<td>Dudley Road B18 7QH Birmingham</td>
<td>0344 892 0111</td>
<td></td>
</tr>
</tbody>
</table>

13/07/2018            EN (English)            SDS Ref.: 101123400 1/8

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]
Press. Gas (Liq.) H280

Full text of hazard classes and H-statements: see section 16

Adverse physicochemical, human health and environmental effects

Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. Contact with the liquid may cause frostbite and serious damage to eyes. Under certain temperature and pressure conditions may form a flammable mixture in the presence of air.

2.2. Label elements

Labelling according to Regulation (EC) No. 1272/2008 [CLP]

Hazard pictograms (CLP): GHS04

Signal word (CLP): Warning

Hazard statements (CLP): H280 - Contains gas under pressure; may explode if heated.

Precautionary statements (CLP): P410+P403 - Protect from sunlight. Store in a well-ventilated place.

2.3. Other hazards

No additional information available

SECTION 3: Composition/information on ingredients

3.1. Substances

Name: Solstice® ze (R-1234ze)
CAS-No.: 29118-24-9
EC-No.: 471-480-0

<table>
<thead>
<tr>
<th>Name</th>
<th>Product identifier</th>
<th>%</th>
<th>Classification according to Regulation (EC) No. 1272/2008 [CLP]</th>
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<tbody>
<tr>
<td>Trans-1,3,3,3-Tetrafluoroprop-1-ene</td>
<td>(CAS-No.) 29118-24-9 (EC-No.) 471-480-0 (REACH-no) 01-0000019758-54</td>
<td>100</td>
<td>Press. Gas (Liq.), H280</td>
</tr>
</tbody>
</table>

Full text of H-statements: see section 16

3.2. Mixtures

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures after inhalation: Move the affected person away from the contaminated area and into the fresh air. If you feel unwell, seek medical advice.

First-aid measures after skin contact: In the event of contact with the liquid: treat resulting frostbite as a burn. Immediately remove contaminated clothing or footwear. Immediately rinse with plenty of water. If skin burns appear, call a doctor immediately.

First-aid measures after eye contact: Rinse immediately and thoroughly, pulling the eyelids well away from the eye (15 minutes minimum). Consult an eye specialist immediately.

First-aid measures after ingestion: Not specifically applicable (gas).

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


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

No additional information available
SECTION 5: Firefighting measures

5.1. Extinguishing media
Unsuitable extinguishing media: Strong water jet.

5.2. Special hazards arising from the substance or mixture
Fire hazard: Difficult to ignite. Heating will cause a rise in pressure with a risk of bursting.
Hazardous decomposition products in case of fire: Toxic and corrosive fumes are released. See Heading 10.

5.3. Advice for firefighters
Firefighting instructions: Use water spray or fog for cooling exposed containers.
Protection during firefighting: Self-contained breathing apparatus. Complete protective clothing.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures
General measures: Avoid contact with skin and eyes. Remove all sources of ignition. Do not smoke. Evacuate the danger area. Do not breathe smoke. Stop the leak.

6.1.1. For non-emergency personnel
No additional information available

6.1.2. For emergency responders
No additional information available

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

6.3. Methods and material for containment and cleaning up
Other information: 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 for safe handling: Avoid breathing spray, mist, fume, gas, dust, vapours. Ensure good ventilation of the work station. Pressurised container. Protect from sunlight and do not expose to temperatures exceeding 50°C. Do not pierce or burn, even after use. Do not spray on an open flame or other ignition source. Heating will cause a rise in pressure with a risk of bursting.
Hygiene measures: Do not drink, eat or smoke in the workplace.

7.2. Conditions for safe storage, including any incompatibilities
Storage conditions: Store: only in the original container, the container tightly closed, in a cool, well-ventilated area, away from direct sunlight.
Incompatible materials: Oxidizing materials.

7.3. Specific end use(s)
No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

<table>
<thead>
<tr>
<th>Solstice® ze (R-1234ze) (29118-24-9)</th>
<th>1,1,1,2-Tetrafluoroethane (Norfluran)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Croatia</td>
<td>Local name</td>
</tr>
<tr>
<td>Croatia</td>
<td>GVI (granična vrijednost izloženosti) (mg/m³)</td>
</tr>
<tr>
<td>Croatia</td>
<td>GVI (granična vrijednost izloženosti) (ppm)</td>
</tr>
<tr>
<td>Slovenia</td>
<td>KTV factor SL</td>
</tr>
<tr>
<td>Sweden</td>
<td>Anmärkning (SE)</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>Local name</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>Remark (RU)</td>
</tr>
<tr>
<td>Australia</td>
<td>Local name</td>
</tr>
<tr>
<td>Australia</td>
<td>TWA (mg/m³)</td>
</tr>
<tr>
<td>Australia</td>
<td>TWA (ppm)</td>
</tr>
</tbody>
</table>

13/07/2018  EN (English)  SDS Ref.: 101123400
SOLSTICE® ze (R-1234ze)
Safety Data Sheet
according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2015/830

Trans-1,3,3,3-Tetrafluoroprop-1-ene (29118-24-9)

| EU | IOELV TWA (ppm) | 800 ppm (recommended) |

<table>
<thead>
<tr>
<th>Trans-1,3,3,3-Tetrafluoroprop-1-ene (29118-24-9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNEL/DMEL (Workers) Long-term - systemic effects, inhalation</td>
</tr>
<tr>
<td>DNEL/DMEL (General population) Long-term - systemic effects, inhalation</td>
</tr>
<tr>
<td>PNEC (Water) PNEC aqua (freshwater)</td>
</tr>
</tbody>
</table>

8.2. Exposure controls

Hand protection:
Leather protective gloves. Nitrile-rubber protective gloves. VITON gloves.

Eye protection:
Safety glasses with side shields.

Skin and body protection:
Majority cotton protective clothing.

Respiratory protection:
In the event of insufficient ventilation: Gas mask with filter type AX. In a confined area: Self-contained breathing apparatus.

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>Physical state</td>
<td>Gas</td>
</tr>
<tr>
<td>Appearance</td>
<td>Press. Gas (Liq.).</td>
</tr>
<tr>
<td>Colour</td>
<td>Colourless</td>
</tr>
<tr>
<td>Odour</td>
<td>Slightly ethereal</td>
</tr>
<tr>
<td>Odour threshold</td>
<td>No data available</td>
</tr>
<tr>
<td>pH</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Relative evaporation rate (butylacetate=1)</td>
<td>No data available</td>
</tr>
<tr>
<td>Melting point</td>
<td>No data available</td>
</tr>
<tr>
<td>Freezing point</td>
<td>No data available</td>
</tr>
<tr>
<td>Boiling point</td>
<td>-19 °C</td>
</tr>
<tr>
<td>Flash point</td>
<td>None</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>368 °C</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>Non flammable. Under certain temperature and pressure conditions may form a flammable mixture in the presence of air</td>
</tr>
<tr>
<td>Vapour pressure</td>
<td>4,27 bar (20°C)</td>
</tr>
<tr>
<td>Vapour pressure at 50 °C</td>
<td>11,15 bar (54.4°C)</td>
</tr>
<tr>
<td>Relative vapour density at 20 °C</td>
<td>4</td>
</tr>
<tr>
<td>Relative density</td>
<td>No data available</td>
</tr>
<tr>
<td>Density</td>
<td>1,17 g/cm³ (21.1°C)</td>
</tr>
<tr>
<td>Solubility</td>
<td>Water: 0,373 g/l</td>
</tr>
<tr>
<td>Log Pow</td>
<td>No data available</td>
</tr>
<tr>
<td>Viscosity, kinematic</td>
<td>No data available</td>
</tr>
<tr>
<td>Viscosity, dynamic</td>
<td>No data available</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>Not explosive material according to EC criteria.</td>
</tr>
<tr>
<td>Oxidising properties</td>
<td>Non oxidizing material according to EC criteria.</td>
</tr>
<tr>
<td>Lower explosive limit (LEL)</td>
<td>None under normal conditions (20°C)</td>
</tr>
<tr>
<td>Upper explosive limit (UEL)</td>
<td>None under normal conditions (20°C)</td>
</tr>
</tbody>
</table>

9.2. Other information

No additional information available.
### SECTION 10: Stability and reactivity

#### 10.1. Reactivity
No additional information available

#### 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
Pressurised container. Protect from sunlight and do not expose to temperatures exceeding 50°C.

#### 10.5. Incompatible materials
Strong oxidizing agents, alkali metals.

#### 10.6. Hazardous decomposition products
On thermal decomposition (pyrolysis), releases: Carbon oxides (CO, CO₂), Fluorinated hydrocarbons, Hydrogen fluoride.

### SECTION 11: Toxicological information

#### 11.1. Information on toxicological effects

- **Acute toxicity (oral):** Not classified
- **Acute toxicity (dermal):** Not classified
- **Acute toxicity (inhalation):** Not classified
- **Skin corrosion/irritation:** Not irritating to skin
- **pH:** Not applicable
- **Contact with the liquid may cause cold burns/frostbite**
- **Serious eye damage/irritation:** Not classified
- **pH:** Not applicable
- **Contact with the liquefied gas may cause severe ocular lesions**
- **Respiratory or skin sensitisation:** Not classified
- **Carcinogenicity:** Not classified
- **Reproductive toxicity:** Not classified
- **STOT-single exposure:** Not classified
- **STOT-repeated exposure:** Not classified

For Trans-1,3,3,3-Tetrafluoroprop-1-ene (29118-24-9):

- **NOAEC (inhalation, rat, gas, 90 days):** 5000 ppmv/6h/day
- **Aspiration hazard:** Not classified

### SECTION 12: Ecological information

#### 12.1. Toxicity

- **Acute aquatic toxicity:** Not classified
- **Chronic aquatic toxicity:** Not classified

For Trans-1,3,3,3-Tetrafluoroprop-1-ene (29118-24-9):

- **EC50 Daphnia 1:** > 160 mg/l/48 Hours (Daphnia magna)

#### 12.2. Persistence and degradability

For Trans-1,3,3,3-Tetrafluoroprop-1-ene (29118-24-9):

- **Persistence and degradability:** Not readily biodegradable.

#### 12.3. Bioaccumulative potential

**Trans-1,3,3,3-Tetrafluoroprop-1-ene (29118-24-9):**

- **Log Pow:** 1.6

#### 12.4. Mobility in soil

No additional information available

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

No additional information available
12.6. Other adverse effects

Other adverse effects: Ozone depletion factor ODP (R-11=1) = 0. Total global warming potential (GWP) : 7.

SECTION 13: Disposal considerations

13.1. Waste treatment methods


Product/Packaging disposal recommendations: Methods of disposal of packaging. Reuse or recycle following decontamination. Destroy at an authorised site.

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

Ecology - waste materials: Must not be discharged to atmosphere. Refer to manufacturer or supplier for information on recovery or recycling.

SECTION 14: Transport information

In accordance with ADR / IATA / IMDG

<table>
<thead>
<tr>
<th>ADR</th>
<th>IMDG</th>
<th>IATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.1. UN number</td>
<td>3163</td>
<td>3163</td>
</tr>
<tr>
<td>14.2. UN proper shipping name</td>
<td>LIQUEFIED GAS, N.O.S. (Trans-1,3,3,3-Tetrafluoroprop-1-ene)</td>
<td>LIQUEFIED GAS, N.O.S. (Trans-1,3,3,3-Tetrafluoroprop-1-ene)</td>
</tr>
<tr>
<td>Transport document description</td>
<td>UN 3163 LIQUEFIED GAS, N.O.S. (Trans-1,3,3,3-Tetrafluoroprop-1-ene), 2.2, (C/E)</td>
<td>UN 3163 LIQUEFIED GAS, N.O.S. (Trans-1,3,3,3-Tetrafluoroprop-1-ene), 2.2</td>
</tr>
<tr>
<td>14.3. Transport hazard class(es)</td>
<td>2.2</td>
<td>2.2</td>
</tr>
</tbody>
</table>

14.4. Packing group

Not applicable

14.5. Environmental hazards

Dangerous for the environment: No

Marine pollutant: No

No supplementary information available

14.6. Special precautions for user

- Overland transport

Classification code (ADR): 2A

Special provisions (ADR): 274, 662

Limited quantities (ADR): 120ml

Excepted quantities (ADR): E1

Packing instructions (ADR): P200

Mixed packing provisions (ADR): MP9

Portable tank and bulk container instructions (ADR): (M), T50

Tank code (ADR): PxBN(M)

Tank special provisions (ADR): TA4, TT9

Vehicle for tank carriage: AT

Transport category (ADR): 3

Special provisions for carriage - Loading, unloading and handling (ADR): CV9, CV10, CV36

Hazard identification number (Kemler No.): 20

Orange plates: 20

Tunnel restriction code (ADR): C/E
Solstice® ze (R-1234ze)  
Safety Data Sheet  
according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2015/830  

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EAC code : 2TE

- Transport by sea

- Special provisions (IMDG) : 274
- Limited quantities (IMDG) : 120 ml
- Excepted quantities (IMDG) : E1
- Packing instructions (IMDG) : P200
- Tank instructions (IMDG) : T50
- EmS-No. (Fire) : F-C
- EmS-No. (Spillage) : S-V
- Stowage category (IMDG) : A

- Air transport

- PCA Excepted quantities (IATA) : E1
- PCA Limited quantities (IATA) : Forbidden
- PCA limited quantity max net quantity (IATA) : Forbidden
- PCA packing instructions (IATA) : 200
- PCA max net quantity (IATA) : 75kg
- CAO packing instructions (IATA) : 200
- CAO max net quantity (IATA) : 150kg
- ERG code (IATA) : 2L

14.7. 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

15.1.1. EU-Regulations

No REACH Annex XVII restrictions
Solstice® ze (R-1234ze) is not on the REACH Candidate List
Solstice® ze (R-1234ze) is not on the REACH Annex XIV List

15.1.2. National regulations

Ensure all national/local regulations are observed.

- Germany
  12th Ordinance Implementing the Federal Immission Control Act - 12.BImSchV : Is not subject of the 12. BImSchV (Hazardous Incident Ordinance)

- Netherlands
  SZW-lijst van kankerverwekkende stoffen : The substance is not listed
  SZW-lijst van mutagene stoffen : The substance is not listed
  NIET-limitatieve lijst van voor de voortplanting giftige stoffen – Borstvoeding : The substance is not listed
  NIET-limitatieve lijst van voor de voortplanting giftige stoffen – Vruchtbaarheid : The substance is not listed
  NIET-limitatieve lijst van voor de voortplanting giftige stoffen – Ontwikkeling : The substance is not listed

- Switzerland
  Swiss National Regulations : ORRChim RS 814.81.

15.2. Chemical safety assessment

No additional information available

SECTION 16: Other information

Indication of changes:

<table>
<thead>
<tr>
<th>Section</th>
<th>Changed item</th>
<th>Change</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.1</td>
<td></td>
<td>Modified</td>
<td></td>
</tr>
</tbody>
</table>

Other information : For more information regarding the use of this product, please refer to our technical information or contact the sales department in your region.

Full text of H- and EUH-statements:
Solstice® ze (R-1234ze)
Safety Data Sheet
according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2015/830

<table>
<thead>
<tr>
<th>Press. Gas (Liq.)</th>
<th>Gases under pressure : Liquefied gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>H280</td>
<td>Contains gas under pressure; may explode if heated.</td>
</tr>
</tbody>
</table>

SDS EU (REACH Annex II)

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.