

**Solstice® L40X (R-455A)**

Version 3.0

Revision Date 05.04.2016

Supersedes 2

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

**1.1. Product identifier**

Product name : Solstice® L40X (R-455A)  
SDS-number : 000000018891  
Type of product : Mixture  
Remarks : SDS according to Art. 31 of Regulation (EC) 1907/2006.

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

Use of the Substance/Mixture : Refrigerant  
Uses advised against : Consumer use

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

Company : Honeywell Fluorine Products Europe B.V.  
Laarderhoogtweg 18  
1101 EA Amsterdam  
Netherlands  
Telephone : (31) 020 5656911  
Telefax : (31) 020 5656600  
For further information, please contact: PMTEU Product Stewardship:  
SafetyDataSheet@Honeywell.com  
Honeywell International, Inc.  
115 Tabor Road  
Morris Plains, NJ 07950-2546  
USA

**1.4. Emergency telephone number**

Emergency telephone number : +1-703-527-3887 (ChemTrec-Transport)  
+1-303-389-1414 (Medical)

**SECTION 2: Hazards identification**


**2.1. Classification of the substance or mixture**

**REGULATION (EC) No 1272/2008**

Flammable gases Category 1  
H220 Extremely flammable gas.  
Gases under pressure Liquefied gas  
H280 Contains gas under pressure; may explode if heated.

**2.2. Label elements**

**REGULATION (EC) No 1272/2008**

Hazard pictograms : 

Signal word : Danger

**Solstice® L40X (R-455A)**

Version 3.0

Revision Date 05.04.2016

Supersedes 2

Hazard statements	: H220 H280	Extremely flammable gas. Contains gas under pressure; may explode if heated.
Precautionary statements	: P210  P260  P280  P284  P308 + P313  P410 + P403	Keep away from heat/sparks/open flames/hot surfaces. No smoking. Do not breathe dust/ fume/ gas/ mist/ vapours/ spray. Wear protective gloves/ eye protection/ face protection. In case of inadequate ventilation wear respiratory protection. IF exposed or concerned: Get medical advice/ attention. Protect from sunlight. Store in a well-ventilated place.

**2.3. Other hazards**

Warning! Container under pressure.

**SECTION 3: Composition/information on ingredients**

**3.1. Substance**

Not applicable

**3.2. Mixture**

Chemical Name	CAS-No. Index-No. Registration number EC-No.	Classification 1272/2008	Concentration	Remarks
2,3,3,3-Tetrafluoroprop-1-ene (Active ingredient)	754-12-1 01-0000019665-61 468-710-7	Flam. Gas 1; H220 Press. Gas ; H280	>= 50 - <= 100	1*
Difluoromethane (Active ingredient)	75-10-5 01-2119471312-47 200-839-4	Flam. Gas 1; H220 Press. Gas ; H280	>= 10 - < 30	1*
Carbon dioxide (Active ingredient)	124-38-9 204-696-9	Press. Gas Press. Gas; H280	<= 10	1*

1\* - For specific concentration limits see Annexes of 1272/2008

Remaining components of this product are non-hazardous and/or are present at concentrations below reportable limits.

**Solstice® L40X (R-455A)**

Version 3.0

Revision Date 05.04.2016

Supersedes 2

Occupational Exposure Limit(s), if available, are listed in Section 8.  
For the full text of the H-Statements mentioned in this Section, see Section 16.

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**SECTION 4: First aid measures**

**4.1 Description of first aid measures**

*General advice:*

First aider needs to protect himself. Move out of dangerous area. Take off all contaminated clothing immediately.

*Inhalation:*

When inhaled remove to fresh air and seek medical aid. If breathing is irregular or stopped, administer artificial respiration. If unconscious place in recovery position and seek medical advice.

*Skin contact:*

Rapid evaporation of the liquid may cause frostbite. In case of contact with liquid, thaw frosted parts with water, then remove clothing carefully. Wash with plenty of water. Wash contaminated clothing before re-use. Consult a physician.

*Eye contact:*

Protect unharmed eye. Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Call a physician immediately.

*Ingestion:*

Ingestion is unlikely because of the physical properties and is not expected to be hazardous. As this product is a gas, refer to the inhalation section.

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

no data available

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

Adrenaline derivatives are contra-indicated. Treat symptomatically.

See Section 11 for more detailed information on health effects and symptoms.

**Solstice® L40X (R-455A)**

Version 3.0

Revision Date 05.04.2016

Supersedes 2

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**SECTION 5: Firefighting measures**

**5.1. Extinguishing media**

*Suitable extinguishing media:*

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

*Extinguishing media which shall not be used for safety reasons:*

High volume water jet

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

Flammable gas.

Contents under pressure.

Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.

Vapors may travel to areas away from work site before igniting/flashing back to vapor source.

Fire or intense heat may cause violent rupture of packages.

Cool closed containers exposed to fire with water spray.

Do not allow run-off from fire fighting to enter drains or water courses.

In case of fire hazardous decomposition products may be produced such as:

Hydrogen fluoride

Carbonyl halides

Carbon monoxide

Carbon dioxide (CO<sub>2</sub>)

**5.3. Advice for firefighters**

In the event of fire and/or explosion do not breathe fumes.

Wear self-contained breathing apparatus and protective suit.

No unprotected exposed skin areas.

Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

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**SECTION 6: Accidental release measures**

**6.1. Personal precautions, protective equipment and emergency procedures**

Evacuate personnel to safe areas. Wear personal protective equipment. Unprotected persons must be kept away. Ventilate the area. Eliminate all ignition sources if safe to do so. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. Ensure that the oxygen content is  $\geq 19.5\%$ .

**6.2. Environmental precautions**

Prevent further leakage or spillage if safe to do so. The product evaporates readily. Discharge into the environment must be avoided.

**6.3. Methods and materials for containment and cleaning up**

Use explosion-proof equipment.

No sparking tools should be used.

Ventilate the area.

# SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006

**Honeywell**

## Solstice® L40X (R-455A)

Version 3.0

Revision Date 05.04.2016

Supersedes 2

Allow to evaporate.

Inform the responsible authorities in case of gas leakage, or of entry into waterways, soil or drains.

Pay attention to the spreading of gases especially at ground level (heavier than air) and to the direction of the wind.

### 6.4. Reference to other sections

For personal protection see section 8.

## SECTION 7: Handling and storage

### 7.1. Precautions for safe handling

#### *Advice on safe handling:*

Exhaust ventilation at the object is necessary. Pressurized container: protect from sunlight and do not expose to temperatures exceeding 50 °C. Do not pierce or burn, even after use. Use suitably rated equipment.

#### *Advice on protection against fire and explosion:*

Container hazardous when empty. Prevent the creation of flammable or explosive concentrations of vapour in air and avoid vapour concentration higher than the occupational exposure limits. Keep product and empty container away from heat and sources of ignition. Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Take measures to prevent the build up of electrostatic charge. Electrical equipment should be protected to the appropriate standard. Use explosion-proof equipment. No sparking tools should be used. No smoking.

#### *Hygiene measures:*

Handle in accordance with good industrial hygiene and safety practice. Ensure adequate ventilation, especially in confined areas. When using do not eat, drink or smoke. Remove and wash contaminated clothing before re-use. Keep working clothes separately. Do not breathe vapour. Avoid contact with skin, eyes and clothing.

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

#### *Further information on storage conditions:*

Keep containers tightly closed in a cool, well-ventilated place. Containers should be protected against falling down. Protect from warmth. Do not store at temperature exceeding 50 °C. Keep away from direct sunlight.

### 7.3. Specific end use(s)

no additional data available

**Solstice® L40X (R-455A)**

Version 3.0

Revision Date 05.04.2016

Supersedes 2

**SECTION 8: Exposure controls/personal protection**

**8.1. Control parameters**

**Occupational exposure limits:**

Components	Basis / Value type	Value / Form of exposure	Exceeding Factor	Remarks
2,3,3,3-Tetrafluoroprop-1-ene	WEEL TWA	500 ppm		
2,3,3,3-Tetrafluoroprop-1-ene	HONEYWELL TWA	500 ppm		
Difluoromethane	HONEYWELL TWA	2.200 mg/m3 1.000 ppm		We are not aware of any national exposure limit.
Carbon dioxide	EH40 WEL TWA	9.150 mg/m3 5.000 ppm		
Carbon dioxide	EH40 WEL STEL	27.400 mg/m3 15.000 ppm		

TWA - Time weighted average  
STEL - Short term exposure limit

**DNEL/ PNEC-Values**

Component	End-use / Impact	Exposure duration	Value	Exposure routes	Remarks
2,3,3,3-Tetrafluoroprop-1-ene	Workers / Long-term systemic effects		950 mg/m3	Inhalation	
Difluoromethane	Workers / Long-term systemic effects		7035 mg/m3	Inhalation	
Difluoromethane	Consumers / Long-term systemic effects		750 mg/m3	Inhalation	
Carbon dioxide					no data available

Component	Environmental compartment / Value	Remarks
2,3,3,3-Tetrafluoroprop-1-ene	Fresh water: > 0,1 mg/l	
2,3,3,3-Tetrafluoroprop-1-ene	Marine water: > 0,01 mg/l	
2,3,3,3-Tetrafluoroprop-1-ene	Fresh water sediment: > 1,77 mg/kg	
2,3,3,3-Tetrafluoroprop-1-ene	Marine sediment: > 0,178 mg/kg	
2,3,3,3-Tetrafluoroprop-1-ene	Soil: > 1,54 mg/kg	
Difluoromethane	Fresh water: 0,142 mg/l	Assessment factor:

**Solstice® L40X (R-455A)**

Version 3.0

Revision Date 05.04.2016

Supersedes 2

		1000
Difluoromethane	Fresh water sediment: 0,534 mg/kg dw	
Carbon dioxide	:	no data available

**8.2. Exposure controls**

**Occupational exposure controls**

The Personal Protective Equipment must be in accordance with EN standards:respirator EN 136, 140, 149; safety glasses EN 166; protective suit: EN 340, 463, 468, 943-1, 943-2; gloves EN 374, safety shoes EN-ISO 20345.  
Do not breathe vapour.

**Engineering measures**

Highly effective exhaust ventilation

**Personal protective equipment**

*Respiratory protection:*

In case of insufficient ventilation wear suitable respiratory equipment.  
Self-contained breathing apparatus (EN 133)

*Hand protection:*

Protective gloves against cold  
(EN 511)

*Eye protection:*

Safety goggles

*Skin and body protection:*

Wear suitable protective equipment.

**Environmental exposure controls**

Handle in accordance with local environmental regulations and good industrial practices.

**SECTION 9: Physical and chemical properties**

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

Form : Liquefied gas  
Colour : clear  
Odour : slight  
Melting point/range : no data available  
Boiling point/boiling range : no data available  
Flash point : Not applicable

**Solstice® L40X (R-455A)**

Version 3.0

Revision Date 05.04.2016

Supersedes 2

Ignition temperature : no data available

Lower explosion limit : 11,8 %(V)  
23 °C  
lower flammability limit

Upper explosion limit : 12,9 %(V)  
23 °C  
upper flammability limit

Vapour pressure : 1.235 kPa  
at 21,1 °C

Vapour pressure : 2.638 kPa  
at 54,4 °C

Density : no data available

pH : Not applicable

Water solubility : no data available

Partition coefficient: n-  
octanol/water : no data available

**9.2 Other Information**

no additional data available

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**SECTION 10: Stability and reactivity**

**10.1. Reactivity**

Stable under normal conditions.

**10.2. Chemical stability**

No decomposition if used as directed.

**10.3. Possibility of hazardous reactions**

Hazardous polymerisation does not occur.

**10.4. Conditions to avoid**

Keep away from heat and sources of ignition.  
Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50 °C.  
Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.

**10.5. Incompatible materials**



# SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006

**Honeywell**

## Solstice® L40X (R-455A)

Version 3.0

Revision Date 05.04.2016

Supersedes 2

Strong oxidizing agents  
Finely divided aluminium  
Finely divided magnesium  
Zinc

### 10.6. Hazardous decomposition products

In case of fire hazardous decomposition products may be produced such as:

Hydrogen fluoride  
Carbonyl halides  
Carbon monoxide  
Carbon dioxide (CO<sub>2</sub>)

## SECTION 11: Toxicological information

### 11.1. Information on toxicological effects

*Acute oral toxicity:*

Not applicable

*Acute dermal toxicity:*

no data available

*Acute inhalation toxicity:*

LC50

Species: Rat

Value: > 520000 ppm

Exposure time: 4 h

Test substance: Difluoromethane (HFC-32)

LC50

Species: Rat

Value: > 400000 ppm

Exposure time: 4 h

Test substance: 2,3,3,3-Tetrafluoroprop-1-ene

*Skin irritation:*

no data available

*Eye irritation:*

no data available

*Respiratory or skin sensitisation:*

Cardiac sensitization

Species: dogs

Result: No effects observed for exposures up to 12% (120,189 ppm).

Test substance: 2,3,3,3-Tetrafluoroprop-1-ene

*Aspiration hazard:*

no data available

*Other information:*

May cause cardiac arrhythmia.

Difluoromethane. (HFC-32): Cardiac sensitisation threshold (dog): 350000 ppm.

**Solstice® L40X (R-455A)**

Version 3.0

Revision Date 05.04.2016

Supersedes 2

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**SECTION 12: Ecological information**

**12.1. Toxicity**

*Toxicity to fish:*

LC50

Species: Cyprinus carpio (Carp)

Value: > 197 mg/l

Exposure time: 96 h

Test substance: 2,3,3,3-Tetrafluoroprop-1-ene

*Toxicity to aquatic plants:*

EC50

Species: Scenedesmus capricornutum (fresh water algae)

Value: > 100 mg/l

Test substance: 2,3,3,3-Tetrafluoroprop-1-ene

*Toxicity to aquatic invertebrates:*

EC50

Species: Daphnia magna (Water flea)

Value: > 83 mg/l

Exposure time: 48 h

Test substance: 2,3,3,3-Tetrafluoroprop-1-ene

**12.2. Persistence and degradability**

Biodegradability : Result: Not readily biodegradable.  
Test substance: 2,3,3,3-Tetrafluoroprop-1-ene

**12.3. Bioaccumulative potential**

no data available

**12.4. Mobility in soil**

no data available

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

no data available

**12.6. Other adverse effects**

Accumulation in aquatic organisms is unlikely.

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**SECTION 13: Disposal considerations**

**13.1. Waste treatment methods**

*Product:*

**Solstice® L40X (R-455A)**

Version 3.0

Revision Date 05.04.2016

Supersedes 2

Dispose according to legal requirements.

*Packaging:*

Legal requirements are to be considered in regard of reuse or disposal of used packaging materials

*Further information:*

Provisions relating to waste:

EC Directive 2006/12/EC; 2008/98/EEC

Regulation No. 1013/2006

For personal protection see section 8.

**SECTION 14: Transport information**

**ADR/RID**

UN Number : 3161  
Description of the goods : LIQUEFIED GAS, FLAMMABLE, N.O.S.  
( R-1234yf, DIFLUOROMETHANE)  
Class : 2  
Classification Code : 2F  
Hazard Identification : 23  
Number  
ADR/RID-Labels : 2.1  
Environmentally hazardous : no

**IATA**

UN Number : 3161  
Description of the goods : Liquefied gas, flammable, n.o.s.  
( R-1234yf, Difluoromethane)  
Class : 2.1  
Hazard Labels : 2.1

**IMDG**

UN Number : 3161  
Description of the goods : LIQUEFIED GAS, FLAMMABLE, N.O.S.  
( R-1234yf, DIFLUOROMETHANE)  
Class : 2.1  
Hazard Labels : 2.1  
EmS Number : F-D, S-U  
Marine pollutant : no

**SECTION 15: Regulatory information**

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

**Other inventory information**

US. Toxic Substances Control Act  
On TSCA Inventory

Canada. Canadian Environmental Protection Act (CEPA). Domestic Substances List (DSL)

**Solstice® L40X (R-455A)**

Version 3.0

Revision Date 05.04.2016

Supersedes 2

All components of this product are on the Canadian DSL

Japan. Kashin-Hou Law List  
On the inventory, or in compliance with the inventory

Korea. Toxic Chemical Control Law (TCCL) List  
On the inventory, or in compliance with the inventory

Philippines. The Toxic Substances and Hazardous and Nuclear Waste Control Act  
Not in compliance with the inventory

New Zealand. Inventory of Chemicals (NZIoC), as published by ERMA New Zealand  
Not in compliance with the inventory

**15.2 Chemical safety assessment**

A Chemical Safety Assessment has not been carried out.

**SECTION 16: Other information**

**Text of H-statements referred to under heading 3**

2,3,3,3-Tetrafluoroprop-1-ene	: H220 H280	Extremely flammable gas. Contains gas under pressure; may explode if heated.
Difluoromethane	: H220 H280	Extremely flammable gas. Contains gas under pressure; may explode if heated.
Carbon dioxide	: H280	Contains gas under pressure; may explode if heated.

**Further information**

All directives and regulations refer to amended versions.  
Vertical lines in the left hand margin indicate a relevant amendment from the previous version.

Abbreviations:

EC European Community  
CAS Chemical Abstracts Service  
DNEL Derived no effect level  
PNEC Predicted no effect level  
vPvB Very persistent and very bioaccumulative substance  
PBT Persistent, bioaccumulative und toxic substance

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific

**Solstice® L40X (R-455A)**

Version 3.0

Revision Date 05.04.2016

Supersedes 2

material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text. Final determination of suitability of any material is the sole responsibility of the user.

This information should not constitute a guarantee for any specific product properties.