

Honeywell Solstice® N40 Refrigerant (R-448A)

000000017419

Version 3.2

Revision Date 03.12.2019

Supersedes 2

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

1.1. Product identifier

Product name : Honeywell Solstice® N40 Refrigerant (R-448A)
SDS-number : 000000017419
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 : none

1.3. Details of the supplier of the safety data sheet

Company	Honeywell Fluorine Products Europe B.V. Stationsplein Zuid-West 961 1117 CE Schiphol-Oost Netherlands	Honeywell International, Inc. 115 Tabor Road Morris Plains, NJ 07950-2546 USA
Telephone	: +32 16 391 211	
Telefax	:	
For further information, please contact:	: PMTEU Product Stewardship: SafetyDataSheet@Honeywell.com	

1.4. Emergency telephone number

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

Country based Poison Control Center : see chapter 15.1

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

REGULATION (EC) No 1272/2008

Gases under pressure Liquefied gas
H280 Contains gas under pressure; may explode if heated.

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2.2. Label elements

REGULATION (EC) No 1272/2008

Hazard pictograms



Signal word : Warning

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

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

2.3. Other hazards

High vapour concentrations can cause headaches, dizziness, drowsiness, and nausea, and may lead to unconsciousness. May cause cardiac arrhythmia.

SECTION 3: Composition/information on ingredients

3.1. Substance

Not applicable

3.2. Mixture

Chemical name	CAS-No. Index-No. REACH Registration Number EC-No.	Classification 1272/2008	Concentration	Remarks
Difluoromethane	75-10-5 01-2119471312-47 200-839-4	Flam. Gas 1; H220 Press. Gas ; H280	26 %	1*
Pentafluoroethane	354-33-6 01-2119485636-25 206-557-8	Press. Gas ; H280	26 %	1*
Norflurane	811-97-2 01-2119459374-33 212-377-0	Press. Gas ; H280	21 %	1*
2,3,3,3-Tetrafluoroprop-1-ene	754-12-1 01-0000019665-61 468-710-7	Flam. Gas 1; H220 Press. Gas ; H280	20 %	1*

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trans-1,3,3,3-Tetrafluoroprop-1-ene	29118-24-9 01-0000019758-54 471-480-0	Press. Gas ; H280	7 %	1*
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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.

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.

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:

Remove to fresh air. Artificial respiration and/or oxygen may be necessary. Call a physician immediately.

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. Consult a physician. Take off contaminated clothing and shoes immediately. Wash contaminated clothing before re-use.

Eye contact:

Remove contact lenses. Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.

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

Do not give adrenaline or similar drugs.

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

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SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media:

The product is not flammable.

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

no data available

5.3. Advice for firefighters

Wear full protective clothing and self-contained breathing apparatus.

Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. In the event of fire, cool tanks with water spray.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Immediately contact emergency personnel. Wear personal protective equipment. Unprotected persons must be kept away. Ensure adequate ventilation. In case of insufficient ventilation wear suitable respiratory equipment. 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.

6.3. Methods and materials for containment and cleaning up

Ventilate the area.

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:

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Open drum carefully as content may be under pressure. The product should only be used in areas from which all naked lights and other sources of ignition have been excluded. Pressurized 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 a naked flame or any incandescent material. Do not use in areas without adequate ventilation. Contaminated equipment (brushes, rags) must be cleaned immediately with water.

Advice on protection against fire and explosion:

The product is not flammable. Can form a combustible mixture with air at pressures above atmospheric pressure.

Hygiene measures:

Handle in accordance with good industrial hygiene and safety practice. Ensure adequate ventilation, especially in confined areas. Avoid contact with skin, eyes and clothing. Remove and wash contaminated clothing before re-use. Keep working clothes separately.

7.2. Conditions for safe storage, including any incompatibilities

Further information on storage conditions:

Store in original container. Keep away from direct sunlight. Keep containers tightly closed in a cool, well-ventilated place.

7.3. Specific end use(s)

no additional data available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limits:

Components	Basis / Value type	Value / Form of exposure	Exceeding Factor	Remarks
Difluoromethane	HONEYWELL TWA	2.200 mg/m ³ 1.000 ppm		We are not aware of any national exposure limit.
Pentafluoroethane	HONEYWELL TWA	1.000 ppm		We are not aware of any national exposure limit.
Norflurane	HONEYWELL TWA	1.000 ppm		
Norflurane	EH40 WEL TWA	4.240 mg/m ³ 1.000 ppm		

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2,3,3,3-Tetrafluoroprop-1-ene	WEEL TWA	500 ppm		
2,3,3,3-Tetrafluoroprop-1-ene	HONEYWELL TWA	500 ppm		
trans-1,3,3,3-Tetrafluoroprop-1-ene	HONEYWELL TWA	800 ppm		We are not aware of any national exposure limit.

TWA - Time weighted average

DNEL/ PNEC-Values

Component	End-use/impact	Exposure duration	Value	Exposure routes	Remarks
Difluoromethane	Workers / Long-term systemic effects		7035 mg/m3	Inhalation	
Difluoromethane	Consumers / Long-term systemic effects		750 mg/m3	Inhalation	
Pentafluoroethane	Workers / Long-term systemic effects		16444 mg/m3	Inhalation	
Pentafluoroethane	Consumers / Long-term systemic effects		1753 mg/m3	Inhalation	
Norflurane	Workers / Long-term systemic effects		13936 mg/m3	Inhalation	
Norflurane	Consumers / Long-term systemic effects		2476 mg/m3	Inhalation	
2,3,3,3-Tetrafluoroprop-1-ene	Workers / Long-term systemic effects		950 mg/m3	Inhalation	
2,3,3,3-Tetrafluoroprop-1-ene	Consumers / Long-term systemic effects		113,1 mg/m3	Inhalation	
2,3,3,3-Tetrafluoroprop-1-ene	Consumers / Acute systemic effects		186400 mg/m3	Inhalation	

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trans-1,3,3,3-Tetrafluoroprop-1-ene	Workers / Long-term systemic effects		3902 mg/m3	Inhalation	
trans-1,3,3,3-Tetrafluoroprop-1-ene	Consumers / Long-term systemic effects		830 mg/m3	Inhalation	

Component	Environmental compartment / Value	Remarks
Difluoromethane	Fresh water: 0,142 mg/l	Assessment factor: 1000
Difluoromethane	Fresh water sediment: 0,534 mg/kg dw	
Pentafluoroethane	Fresh water: 0,1 mg/l	Assessment factor: 1000
Pentafluoroethane	Fresh water sediment: 0,6 mg/kg dw	
Norflurane	Fresh water: 0,1 mg/l	Assessment factor: 1000
Norflurane	Marine water: 0,01 mg/l	Assessment factor: 10000
Norflurane	Fresh water sediment: 0,75 mg/kg	Assessment factor: 100
Norflurane	Sewage treatment plant: 73 mg/l	Assessment factor: 10
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	
trans-1,3,3,3-Tetrafluoroprop-1-ene	Fresh water: 0,1 mg/l	Assessment factor: 1000

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, 511;

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safety shoes EN-ISO 20345.

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)
Gloves must be inspected prior to use.
Replace when worn.

Eye protection:

Safety glasses with side-shields conforming to EN166
Face-shield

Skin and body protection:

Protective footwear

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 colourless
Odour	: slight ether-like
Melting point/range	: no data available
Boiling point/boiling range	: -45,9 - -39,8 °C
Flash point	: Not applicable
Auto-ignition temperature	: 628 °C
Vapour pressure	: 1.120 kPa at 21,1 °C
Vapour pressure	: 2.588 kPa

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at 54,4 °C

Density	:	1,11 g/cm ³
pH	:	neutral
Water solubility	:	no data available
Partition coefficient: n-octanol/water	:	no data available
Relative vapour density	:	2,98 (Air = 1.0)

9.2 Other Information

no additional data available

SECTION 10: Stability and reactivity

10.1. Reactivity

Stable under normal conditions.
Hazardous polymerisation does not occur.

10.2. Chemical stability

no data available

10.3. Possibility of hazardous reactions

no data available

10.4. Conditions to avoid

Heating will cause pressure rise with risk of bursting
Pressurized 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 a naked flame or any incandescent material.

10.5. Incompatible materials

oxidising substances
Possible incompatibility with alkali sensitive materials.
Powdered metals

10.6. Hazardous decomposition products

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Halogenated compounds
Hydrogen fluoride
Carbonyl halides
Carbon oxides

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: > 769000 ppm
Exposure time: 4 h
Test substance: Ethane, pentafluoro- (HFC-125)

LC50
Species: Rat
Value: > 500000 ppm
Exposure time: 4 h
Test substance: 1,1,1,2-tetrafluoroethane (HFC-134a)

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:
no data available

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Aspiration hazard:

no data available

Other information:

May cause cardiac arrhythmia.

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

Ethane, pentafluoro- (HFC-125): Cardiac sensitisation threshold (dog): 75000 ppm.

1,1,1,2-tetrafluoroethane (HFC-134a): Cardiac sensitisation threshold (dog): 80000 ppm.

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

Biodegradability:

Biodegradation: 5 %

Result: Not readily biodegradable.

Test substance: Ethane, pentafluoro- (HFC-125)

12.3. Bioaccumulative potential

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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

no data available

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Product:

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 : 3163

Description of the goods : LIQUEFIED GAS, N.O.S.
(PENTAFLUOROETHANE, DIFLUOROMETHANE, 1,1,1,2-TETRAFLUOROETHANE)

Class : 2

Classification Code : 2A

Hazard Identification : 20

Number

ADR/RID-Labels : 2.2

Environmentally hazardous : no

IATA

UN Number : 3163

Description of the goods : Liquefied gas, n.o.s.

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(Pentafluoroethane, Difluoromethane, 1,1,1,2-Tetrafluoroethane)
Class : 2.2
Hazard Labels : 2.2

IMDG

UN Number : 3163
Description of the goods : LIQUEFIED GAS, N.O.S.
(PENTAFLUOROETHANE, DIFLUOROMETHANE, 1,1,1,2-TETRAFLUOROETHANE)
Class : 2.2
Hazard Labels : 2.2
EmS Number : F-C, S-V
Marine pollutant : no

SECTION 15: Regulatory information

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

Poison Control Center

Country	Phone Number
Austria	+4314064343
Belgium	070 245245
Bulgaria	(+35929154233
Croatia	(+3851)23-48-342
Cyprus	+357 2240 5611
Czech Republic	+420224919293; +420224915402
Denmark	82121212
Estonia	16662; (+372)6269390
Finland	9471977
France	+33(0)145425959
Greece	+30 210 779 3777
Hungary	(+36-80)201-199
Iceland	5432222
Ireland	+353(1)8092166
Italy	+39 0649906140
Germany	Berlin : 030/19240
	Bonn : 0228/19240

Country	Phone Number
Liechtenstein	+41 442515151
Lithuania	+370532362052
Luxembourg	070245245; (+352)80002-5500
Malta	+356 2395 2000
Netherlands	030-2748888
Norway	22591300
Poland	+48 42 25 38 400
Portugal	808250143
Romania	+40 21 318 3606
Slovakia (NTIC)	+421 2 54 774 166
Slovenia	+386 1 400 6051
Spain	+34915620420
Sweden	112 (begär Giftinformation); +46104566786
Switzerland	145
United Kingdom	(+44) 844 892 0111

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	Erfurt : 0361/730730
	Freiburg : 0761/19240
	Göttingen : 0551/19240
	Homburg : 06841/19240
	Mainz : 06131/19240
	Munich : 089/19240
Latvia	+37167042473

Other inventory information

US. Toxic Substances Control Act
On TSCA Inventory

Australia. Industrial Chemical (Notification and Assessment) Act
On the inventory, or in compliance with the inventory

Canada. Canadian Environmental Protection Act (CEPA). Domestic Substances List (DSL)
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. Existing Chemicals Inventory (KECI)
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

China. Inventory of Existing Chemical Substances (IECSC)
On the inventory, or in compliance with the inventory

New Zealand. Inventory of Chemicals (NZIoC), as published by ERMA New Zealand
On the inventory, or 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

Difluoromethane : H220 Extremely flammable gas.
H280 Contains gas under pressure; may explode

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if heated.

Pentafluoroethane	:	H280	Contains gas under pressure; may explode if heated.
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Norflurane	:	H280	Contains gas under pressure; may explode if heated.
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2,3,3,3-Tetrafluoroprop-1-ene	:	H220 H280	Extremely flammable gas. Contains gas under pressure; may explode if heated.
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trans-1,3,3,3-Tetrafluoroprop-1-ene	:	H280	Contains gas under pressure; may explode if heated.
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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 and 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 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.