

# SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006

# Honeywell

## Honeywell Solstice® N40 Refrigerant (R-448A)

Version 2.0

Revision Date 20.07.2015

Supersedes 1

### 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.  
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.  
101 Columbia Road  
Morristown, NJ 07962-1057  
USA

#### 1.4. Emergency telephone number

Emergency telephone number : (32) 16 391 209 (Mon-Fri, 9.00-17.00h)  
3887 (ChemTrec)  
+1-303-389-1414 (Medical) +1-703-527-

### 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.

#### 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 : P281 Use personal protective equipment as

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P260	required. Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P410 + P403	Protect from sunlight. Store in a well- ventilated place.

### 2.3. Other hazards

Warning! Container under pressure.

## 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
Difluoromethane (Active ingredient)	75-10-5 01-2119471312-47 200-839-4	Flam. Gas 1; H220 Press. Gas ; H280	26	1*
Pentafluoroethane (Active ingredient)	354-33-6 01-2119485636-25 206-557-8	Press. Gas ; H280	26	1*
Norflurane (Active ingredient)	811-97-2 01-2119459374-33 212-377-0	Press. Gas ; H280	21	1*
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	20	1*
trans-1,3,3,3- Tetrafluoroprop-1-ene (Active ingredient)	29118-24-9 01-0000019758-54 471-480-0	Press. Gas ; H280	7	1*

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

N.C.\* - Non-hazardous substance - for information only

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.

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**4. FIRST AID MEASURES****4.1 Description of first aid measures***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. :

**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**

Possibility of generating hazardous reactions during a fire due to the presence of F and Cl groups.

Heating will cause pressure rise with risk of bursting

Cool closed containers exposed to fire with water spray.

This product is not flammable at ambient temperatures and atmospheric pressure.

However, this material can ignite when mixed with air under pressure and exposed to strong ignition sources.

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**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.

**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.

**7. HANDLING AND STORAGE****7.1. Precautions for safe handling***Advice on safe handling:*

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

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### 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 <sup>3</sup> 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 <sup>3</sup> 1.000 ppm		
2,3,3,3-Tetrafluoroprop-1-ene	WEL 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/m <sup>3</sup>	Inhalation	
Difluoromethane	Consumers / Long-term systemic effects		750 mg/m <sup>3</sup>	Inhalation	
Pentafluoroethane	Workers / Long-term systemic effects		16444 mg/m <sup>3</sup>	Inhalation	
Pentafluoroethane	Consumers / Long-term systemic effects		1753 mg/m <sup>3</sup>	Inhalation	
Norflurane	Workers / Long-term systemic effects		13936 mg/m <sup>3</sup>	Inhalation	
Norflurane	Consumers / Long-term systemic effects		2476 mg/m <sup>3</sup>	Inhalation	

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2,3,3,3-Tetrafluoroprop-1-ene	Workers / Long-term systemic effects		23000 mg/m <sup>3</sup>	Inhalation	
trans-1,3,3,3-Tetrafluoroprop-1-ene	Workers / Long-term systemic effects		3902 mg/m <sup>3</sup>	Inhalation	
trans-1,3,3,3-Tetrafluoroprop-1-ene	Consumers / Long-term systemic effects		830 mg/m <sup>3</sup>	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, safety shoes EN-ISO 20345.

### Personal protective equipment

#### Respiratory protection:

In case of insufficient ventilation wear suitable respiratory equipment.

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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.

## 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	:	no data available
Flash point	:	Not applicable
Ignition temperature	:	no data available
Vapour pressure	:	1.120 kPa at 21,1 °C
Vapour pressure	:	2.588 kPa at 54,4 °C
Density	:	no data available
pH	:	neutral
Water solubility	:	no data available
Partition coefficient: n- octanol/water	:	no data available
Relative vapour density	:	no data available

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### 9.2 Other Information

no additional data available

## 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

Halogenated compounds  
Hydrogen fluoride  
Carbonyl halides  
Carbon oxides

## 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



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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

*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.

## 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:*

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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

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

## 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.

## 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

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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.  
(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

## 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)  
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.

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### 16. OTHER INFORMATION

#### Text of R-phrases and H-statements referred to under heading 3

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