

**HFC-134a, Genetron® 134a**

000000009876

Version 3.4

Revision Date 12.03.2019

Supersedes 2

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

**1.1. Product identifier**

Product name : HFC-134a, Genetron® 134a  
SDS-number : 000000009876  
Type of product : Substance  
Remarks : SDS according to Art. 31 of Regulation (EC) 1907/2006.  
Chemical name : Norflurane  
CAS-No. : 811-97-2  
REACH Registration Number : 01-2119459374-33

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

Use of the Substance/Mixture : Refrigerant  
Propellant  
Heat transfer fluid  
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**

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**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 : P280 Wear protective gloves/ eye protection/ face protection.  
P284 In case of inadequate ventilation wear respiratory protection.  
P410 + P403 Protect from sunlight. Store in a well-ventilated place.

**2.3. Other hazards**

Warning! Container under pressure. Results of PBT and vPvB assessment, see chapter 12.5.

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

**3.1. Substance**

Chemical name	CAS-No. Index-No. REACH Registration Number EC-No.	Classification 1272/2008	Concentration	Remarks
Norflurane	811-97-2 01-2119459374-33 212-377-0	Press. Gas ; H280	99,8 %	1*

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

**3.2. Mixture**

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Not applicable

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.

*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:*

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

**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.

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

Contents under pressure.

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.

Container may rupture on heating.

Cool closed containers exposed to fire with water spray.

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

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

Fire may cause evolution of:

Halogenated compounds

Hydrogen fluoride

Carbon oxides

Carbonyl halides

**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.

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**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.

**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.

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**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:*

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.

*Hygiene measures:*

Provide adequate ventilation. When using do not eat or drink.

**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
Norflurane	HONEYWELL TWA	1.000 ppm		
Norflurane	EH40 WEL TWA	4.240 mg/m3 1.000 ppm		

TWA - Time weighted average

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**DNEL/ PNEC-Values**

Component	End-use/impact	Exposure duration	Value	Exposure routes	Remarks
Norflurane	Workers / Long-term systemic effects		13936 mg/m3	Inhalation	
Norflurane	Consumers / Long-term systemic effects		2476 mg/m3	Inhalation	

Component	Environmental compartment / Value	Remarks
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

**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; 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:*

Glove material: Viton (R)  
Break through time: > 480 min  
Glove thickness: 0,7 mm  
Vitoject® 890  
Protective gloves against cold (EN 511)  
Gloves must be inspected prior to use.  
Replace when worn.

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Remarks: Supplementary note: The specifications are based on information and tests from similar substances by analogy.  
Due to varying conditions ( e.g.temperature or other strains) it must be considered that the usage of a chemical protective glove in practice may be much shorter than the permeation time determined in accordance with EN 374.  
Since actual conditions of practical use often deviate from standardised conditions according EN 374 the glove manufacturer recommends to use the chemical protective glove in practice not longer than 50% of the recommended permeation time.  
Manufacturer's directions for use should be observed because of great diversity of types .  
Suitable gloves tested according EN 374 are supplied e.g. from KCL GmbH, D-36124 Eichenzell, Vertrieb@kcl.de

### *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	:	colourless
Odour	:	weak
molecular weight	:	102,02 g/mol
Melting point/range	:	-101 °C
Boiling point/boiling range	:	-26,2 °C
Flash point	:	Not applicable
Flammability (solid, gas)	:	no data available
Ignition temperature	:	> 750 °C
Lower explosion limit	:	no data available
Upper explosion limit	:	no data available

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Vapour pressure	:	5.915 hPa at 21,1 °C
Vapour pressure	:	14.713 hPa at 54,4 °C
Density	:	1,2 g/cm <sup>3</sup>
pH	:	neutral
Water solubility	:	1,5 g/l
Partition coefficient: n-octanol/water	:	log Pow 1,06 The product is more soluble in octanol.
Relative vapour density	:	3,5
Evaporation rate	:	> 1 Method: Compared to CCl <sub>4</sub> .

**9.2 Other Information**

no additional data available

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**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.



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### 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

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## 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: > 500000 ppm

Exposure time: 4 h

*Skin irritation:*

no data available

*Eye irritation:*

no data available

*Respiratory or skin sensitisation:*

no data available

*Carcinogenicity:*

Note: Not classified as a human carcinogen. Substance not expected to be a carcinogen based on available data.

*Germ cell mutagenicity:*

Test Method: Ames test

Result: negative

Method: OECD Test Guideline 471

Species: Mouse

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Result: negative

*Reproductive toxicity:*

Species: Mouse

Route of Application: Inhalation

General Toxicity - Parent: NOEL: 50.000 ppm

Method: OECD Test Guideline 414

Species: Rabbit

Route of Application: Inhalation

General Toxicity Maternal: NOEL: 2.500 ppm

Embryo-fetal toxicity: NOEL: 40.000 ppm

*Aspiration hazard:*

no data available

*Other information:*

no data available

## SECTION 12: Ecological information

### 12.1. Toxicity

*Toxicity to fish:*

LC50

semi-static test

Species: *Oncorhynchus mykiss* (rainbow trout)

Value: 450 mg/l

Exposure time: 96 h

Method: 92/69/EEC, C.1

*Toxicity to aquatic plants:*

Growth rate

Species: *Selenastrum capricornutum* (green algae)

Value: > 118 mg/l

Exposure time: 72 h

Method: OECD Test Guideline 201

*Toxicity to Microorganisms:*

EC10

Growth inhibition

Species: *Pseudomonas putida*

Value: > 730 mg/l

Exposure time: 6 h

*Toxicity to aquatic invertebrates:*

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EC50

static test

Species: Daphnia magna (Water flea)

Value: 980 mg/l

Exposure time: 48 h

Method: EEC 92/69/V, C2

### 12.2. Persistence and degradability

*Biodegradability:*

Biodegradation: 3 %

Exposure time: 28 d

Result: Not rapidly biodegradable

Method: OECD 301 D

### 12.3. Bioaccumulative potential

no data available

### 12.4. Mobility in soil

no data available

### 12.5. Results of PBT and vPvB assessment

This substance is not considered to be persistent, bioaccumulating and toxic (PBT).

This substance is not considered to be very persistent and very bioaccumulating (vPvB).

### 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:*

Offer surplus and non-recyclable solutions to a licensed disposal company. Refer to manufacturer/supplier for information on recovery/recycling. Classification: 14.06.01

*Further information:*

Provisions relating to waste:

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

Regulation No. 1013/2006

For personal protection see section 8.

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## SECTION 14: Transport information

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**ADR/RID**

UN Number : 3159  
Description of the goods : 1,1,1,2-TETRAFLUOROETHANE  
Class : 2  
Classification Code : 2A  
Hazard Identification Number : 20  
ADR/RID-Labels : 2.2  
Environmentally hazardous : no

**IATA**

UN Number : 3159  
Description of the goods : 1,1,1,2-Tetrafluoroethane  
Class : 2.2  
Hazard Labels : 2.2

**IMDG**

UN Number : 3159  
Description of the goods : 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	no data available
Czech Republic	+420224919293; +420224915402
Denmark	82121212
Estonia	16662; (+372)6269390
Finland	9471977
France	+33(0)145425959

Country	Phone Number
Liechtenstein	no data available
Lithuania	+370532362052
Luxembourg	070245245; (+352)80002-5500
Malta	no data available
Netherlands	030-2748888
Norway	22591300
Poland	no data available
Portugal	808250143
Romania	no data available
Slovakia (NTIC)	+421 2 54 774 166

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Greece	no data available
Hungary	(+36-80)201-199
Iceland	5432222
Ireland	+353(1)8092166
Italy	+39 0649906140
Germany	Berlin : 030/19240
	Bonn : 0228/19240
	Erfurt : 0361/730730
	Freiburg : 0761/19240
	Göttingen : 0551/19240
	Homburg : 06841/19240
	Mainz : 06131/19240
Munich : 089/19240	
Latvia	+37167042473

Slovenia	no data available
Spain	+34915620420
Sweden	112 (begär Gifinformation); +46104566786
Switzerland	145
United Kingdom	no data available

### 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  
On the inventory, or in compliance with the inventory

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

NZIOC - New Zealand  
On the inventory, or in compliance with the inventory

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### 15.2 Chemical safety assessment

A chemical safety assessment has been carried out. In accordance to the article 14(4) of the REACH regulation (EC) No. 1907/2006, exposure estimation and risk characterization is not required.

## SECTION 16: Other information

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

Norflurane : 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 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.

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