

**Trade name:** R134a**Product no.:** R134a**Current version :** 2.0.0, issued: 06.04.2023**Replaced version:** 1.0.0, issued: 04.02.2022**Region:** GB**SECTION 1: Identification of the substance/mixture and of the company/undertaking****1.1 Product identifier****Trade name****R134a****Substance name** 1,1,1,2-tetrafluoroethane  
**REACH registration no.** 01-2119459374-33**Identification numbers****CAS no.** 811-97-2  
**EC no.** 212-377-0**1.2 Relevant identified uses of the substance or mixture and uses advised against****Relevant identified uses of the substance or mixture**Industrial Use  
Professional use  
Refrigerant**Uses advised against**

Consumer use

**1.3 Details of the supplier of the safety data sheet****Address**TEGA - Technische Gase und Gasetechnik GmbH  
Werner-von-Siemens-Straße 18  
97076 Würzburg**Telephone no.** +49 931 2093-220  
**Fax no.** +49 931 2093-180  
**e-mail** kaeltmittel@tega.de**Advice on Safety Data Sheet**

sdb\_info@umco.de

**1.4 Emergency telephone number**For medical advice (in German and English):  
+49 (0)551 192 40 (Giftinformationszentrum Nord)**SECTION 2: Hazards identification****2.1 Classification of the substance or mixture****Classification in accordance with Regulation (EC) No 1272/2008 (CLP)**

Press. Gas liq.; H280

**Classification information**

This product is assessed and classified using the methods and criteria below referred to in Article 9 of Regulation (EC) n° 1272/2008:

Physical hazards: determined through assessment data based on the methods or standards referred to in part 2 of Annex I to CLP

Health hazards and environmental hazards: determined through toxicological and ecotoxicological assessment data based on the methods or standards referred to in Part 3 and 4 of Annex I to CLP.

**2.2 Label elements****Labelling according to Regulation (EC) No 1272/2008 (CLP Regulation)****Product identifier**

811-97-2 (norflurane)

**Hazard pictograms**

**Trade name:** R134a**Product no.:** R134a**Current version :** 2.0.0, issued: 06.04.2023**Replaced version:** 1.0.0, issued: 04.02.2022**Region:** GB

GHS04

**Signal word**

Warning

**Hazard statement(s)**

H280 Contains gas under pressure; may explode if heated.

**Precautionary statement(s)**

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

**Supplemental label elements**

Use prescribed personal protective equipment.

Asphyxiant at high concentrations. Contains fluorinated greenhouse gases covered by the Kyoto Protocol.

Do not release into the environment.

Use only in accordance with safety data sheet.

Refilling prohibited.

**2.3 Other hazards**

Danger of suffocation by displacement of air / oxygen. Contact with the liquid can cause cold burns or frostbite. Please observe the information given in this safety data sheet.

PBT assessment

The product is not considered to be a PBT.

vPvB assessment

The product is not considered to be a vPvB.

**SECTION 3: Composition/information on ingredients****3.1 Substances****Chemical characterization**

Substance name 1,1,1,2-tetrafluoroethane

Formula C<sub>2</sub>H<sub>2</sub>F<sub>4</sub>

Molecular weight 102.04

**Identification numbers**

CAS no. 811-97-2

EC no. 212-377-0

**3.2 Mixtures**

Not applicable. The product is not a mixture.

**SECTION 4: First aid measures****4.1 Description of first aid measures****General information**

In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. Remove affected person from danger area, lay him down. Seek medical advice immediately.

**After inhalation**

Remove affected persons from dangerous area by observing suitable respiratory protection measures. Ensure supply of fresh air. Irregular breathing/no breathing: artificial respiration. Call a doctor immediately.

**After skin contact**

In case of contact with skin wash off immediately with soap and water. Rinse with much water in case of frostbites. Remove clothes only after unfreezing. Cover wounds with sterile dressing. Call a doctor immediately.

**After eye contact**

Remove contact lenses. Rinse eye thoroughly under running water keeping eyelids wide open and protecting the unaffected eye (at least 10 to 15 minutes). Seek medical assistance.

**After ingestion**

**Trade name:** R134a**Product no.:** R134a**Current version :** 2.0.0, issued: 06.04.2023**Replaced version:** 1.0.0, issued: 04.02.2022**Region:** GB

Rinse the mouth thoroughly with water. Do not induce vomiting. Never give anything by mouth to an unconscious person.

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

##### Symptoms

The following symptoms may occur: respiratory arrest. Shortness of breath; Light-headedness; muscle incoordination; Unconsciousness; cardiac arrhythmia; Nausea; headaches; Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling. May be fatal if inhaled.

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

Do not administer any preparations of the adrenaline-ephedrine group. Treat symptomatically.

### SECTION 5: Firefighting measures

#### 5.1 Extinguishing media

##### Suitable extinguishing media

Extinguishing powder; Water spray jet; Water mist; Foam; Carbon dioxide; Extinguishing measures to suit surroundings.

##### Unsuitable extinguishing media

High power water jet

#### 5.2 Special hazards arising from the substance or mixture

In the event of fire, the following can be released: Carbon monoxide and carbon dioxide; Hydrogen fluoride (HF); Carbonyl fluoride; May explode if exposed to heat. Liquefied gas: Spilled liquid can cause cold burns. This gas is heavier than air and may accumulate in low areas.

#### 5.3 Advice for firefighters

Use self-contained breathing apparatus. Wear full protective suit. Containers close to fire should be transferred to a safe place. Cool closed containers exposed to fire with water. Pressure increase, bursting and explosion hazard during heating. Fire residues and contaminated firefighting water must be disposed of in accordance with the local regulations.

### SECTION 6: Accidental release measures

#### 6.1 Personal precautions, protective equipment and emergency procedures

##### For non-emergency personnel

Refer to protective measures listed in sections 7 and 8. Provide good room ventilation even at ground level (vapours are heavier than air). Do not breathe gas. Keep away from ignition sources. Use personal protective clothing. Cordon and mark contaminated area. Remove persons to safety.

##### For emergency responders

No data available. Personal protective equipment (PPE) - see Section 8.

#### 6.2 Environmental precautions

Avoid release in the environment. Suppress gases/vapours/mists with water spray jet.

#### 6.3 Methods and material for containment and cleaning up

Ensure adequate ventilation. Dispose of absorbed material in accordance with the regulations.

#### 6.4 Reference to other sections

Information regarding safe handling, see section 7. Information regarding personal protective measures, see section 8. Information regarding waste disposal, see section 13.

### SECTION 7: Handling and storage

#### 7.1 Precautions for safe handling

##### Advice on safe handling

Trade name: R134a

Product no.: R134a

Current version : 2.0.0, issued: 06.04.2023

Replaced version: 1.0.0, issued: 04.02.2022

Region: GB

Only qualified and trained persons are authorised to handle. Provide good ventilation at the work area (local exhaust ventilation, if necessary). To be used only according to instructions for use. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose containers heat or sources of ignition. In case of accidental release: danger due to low temperature of the liquid product. The product should only be used in areas from which all naked lights and other sources of ignition have been excluded. Prevent the creation of flammable or explosive concentrations of vapour in air and avoid vapour concentration higher than the occupational exposure limits. Pressurized container: protect from sunlight and do not expose to temperatures exceeding 50 °C. Do not pierce or burn, even after use. Comply with the health and safety at work laws.

**General protective and hygiene measures**

Wash hands before breaks and after work. Do not inhale gases. Do not eat, drink or smoke during work time. Keep away from foodstuffs and beverages. Have emergency shower available.

**Advice on protection against fire and explosion**

The product is not combustible. The substance can form a combustible mixture with air at elevated pressure. Isolate from sources of heat, sparks and open flame. Take precautionary measures against electrostatic loading (earthing necessary during loading operations). Electrical equipment should be protected to the appropriate standard.

**7.2 Conditions for safe storage, including any incompatibilities****Technical measures and storage conditions**

Keep container tightly closed in a cool, well-ventilated place, open and handle carefully. Protect from heat and direct sunlight.

**Recommended storage temperature**

Value < 50 °C

**Requirements for storage rooms and vessels**

Containers which are opened must be carefully closed and kept upright to prevent leakage. Always keep in containers of same material as the original.

**Incompatible products**

Substances to be avoided, see section 10.

**7.3 Specific end use(s)**

No data available.

**SECTION 8: Exposure controls/personal protection****8.1 Control parameters****Occupational exposure limit values**

No	Substance name	CAS no.	EC no.
1	norflurane	811-97-2	212-377-0
<b>List of approved workplace exposure limits (WELs) / EH40</b>			
1,1,1,2-Tetrafluoroethane (HFC134a)			
	WEL long-term (8-hr TWA reference period)	4240	mg/m <sup>3</sup> 1000 ppm

**DNEL, DMEL and PNEC values****DNEL values (worker)**

No	Substance name	CAS / EC no		
	Route of exposure	Exposure time	Effect	Value
1	norflurane	811-97-2 212-377-0		
	inhalative	Long term (chronic)	systemic	13936 mg/m <sup>3</sup>

**DNEL value (consumer)**

No	Substance name	CAS / EC no		
	Route of exposure	Exposure time	Effect	Value
1	norflurane	811-97-2 212-377-0		
	inhalative	Long term (chronic)	systemic	2476 mg/m <sup>3</sup>

**PNEC values**

Trade name: R134a

Product no.: R134a

Current version : 2.0.0, issued: 06.04.2023

Replaced version: 1.0.0, issued: 04.02.2022

Region: GB

No	Substance name		CAS / EC no	
	ecological compartment	Type	Value	
1	norflurane		811-97-2 212-377-0	
	water	fresh water	0.1	mg/L
	water	marine water	0.01	mg/L
	water	fresh water sediment	0.75	mg/kg dry weight
	sewage treatment plant	-	73	mg/L

## 8.2 Exposure controls

### Appropriate engineering controls

Ensure adequate ventilation, local exhaust at the work station if necessary. If these are not sufficient to maintain concentrations of particulates and solvent vapour below the OEL, suitable respiratory protection must be worn.

### Personal protective equipment

#### Respiratory protection

Self-contained breathing apparatus. Danger of suffocation due to high concentrations in breathing air.

#### Eye / face protection

Tightly fitting safety glasses (EN 166).

#### Hand protection

In case of risk of coming into contact with liquefied product, wear cryogenic gloves to give protection (against freezer burn and frostbite); (DIN EN 374). Before use, the protective gloves should be tested in any case for its specific work-station suitability (i.e. mechanical resistance, product compatibility and antistatic properties). Adhere to the manufacturer's instructions and information relating to the use, storage, care and replacement of protective gloves. Protective gloves shall be replaced immediately when physically damaged or worn. Design operations thus to avoid permanent use of protective gloves.

#### Other

Chemical-resistant work clothes. Protective shoes.

#### Environmental exposure controls

Information regarding waste disposal, see chapter 13.

## SECTION 9: Physical and chemical properties

### 9.1 Information on basic physical and chemical properties

<b>State of aggregation</b>			
gas			
<b>Form</b>			
liquified gas			
<b>Colour</b>			
colourless			
<b>Odour</b>			
slightly like ether			
<b>pH value</b>			
No data available			
<b>Boiling point / boiling range</b>			
Value	-26	°C	
Reference pressure	1013	hPa	
<b>Melting point/freezing point</b>			
No data available			
<b>Setting point / solidification range</b>			
Value	-108	°C	
Reference pressure	1013	hPa	

with 1907/2006/EC

Trade name: R134a

Product no.: R134a

Current version : 2.0.0, issued: 06.04.2023

Replaced version: 1.0.0, issued: 04.02.2022

Region: GB

**Decomposition temperature**

No data available

**Flash point**

No data available

**Ignition temperature**

No data available

**Auto-ignition temperature**

Value 743 °C

**Oxidising properties**

The product does not have oxidizing properties.

**Flammability**

The product is non-flammable.

**Lower explosion limit**

No data available

**Upper explosion limit**

No data available

**Vapour pressure**Value 5700 hPa  
Reference temperature 20 °C**Relative vapour density**

No data available

**Evaporation rate**Value > 1  
Comments CCl4 = 1**Relative density**Value 4.24  
Reference temperature 20 °C**Density**

No data available

**Solubility in water**Value 1 g/l  
Reference temperature 25 °C**Solubility**

No data available

**Partition coefficient n-octanol/water (log value)**

No	Substance name	CAS no.	EC no.
1	norflurane	811-97-2	212-377-0
	log Pow		1.06
	Reference temperature		25 °C
	with reference to	pH 6.0	
	Method	OECD 107	
	Source	ECHA	

**Kinematic viscosity**

No data available

**Particle characteristics**

No data available

**9.2 Other information****Other information**

Trade name: R134a

Product no.: R134a

Current version : 2.0.0, issued: 06.04.2023

Replaced version: 1.0.0, issued: 04.02.2022

Region: GB

No data available.

**SECTION 10: Stability and reactivity****10.1 Reactivity**

Dangerous reactions are not expected if the product is handled according to its intended use. For the avoidance of thermal reaction does not overheat.

**10.2 Chemical stability**

Stable under recommended storage and handling conditions (See section 7).

**10.3 Possibility of hazardous reactions**

Stable under recommended storage and handling conditions (See section 7).

**10.4 Conditions to avoid**

Temperatures > 50°C. Heat, naked flames and other ignition sources.

**10.5 Incompatible materials**

Alkali metals; Earth alkali metals; Metal as powder; powdered metal salts

**10.6 Hazardous decomposition products**

None, if handled according to intended use. In case of fire: see section 5.

**SECTION 11: Toxicological information****11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008****Acute oral toxicity**

No data available

**Acute dermal toxicity**

No data available

**Acute inhalational toxicity**

No data available

**Skin corrosion/irritation**

No data available

**Serious eye damage/irritation**

No data available

**Respiratory or skin sensitisation**

No data available

**Germ cell mutagenicity**

No	Substance name	CAS no.	EC no.
1	norflurane	811-97-2	212-377-0
Type of examination		Genotoxicity in vitro	
Species		Salmonella typhimurium	
Method		OECD 471	
Source		ECHA	
Evaluation/classification		Based on available data, the classification criteria are not met.	
Type of examination		Genotoxicity in vitro	
Species		Human Lymphocyte	
Method		OECD 473	
Source		ECHA	
Evaluation/classification		Based on available data, the classification criteria are not met.	
Route of exposure		inhalational	
Type of examination		Genotoxicity in vivo	
Species		mouse	
Method		EPA	
Source		ECHA	
Evaluation/classification		Based on available data, the classification criteria are not met.	

Trade name: R134a

Product no.: R134a

Current version : 2.0.0, issued: 06.04.2023

Replaced version: 1.0.0, issued: 04.02.2022

Region: GB

Reproduction toxicity			
No	Substance name	CAS no.	EC no.
1	norflurane	811-97-2	212-377-0
Route of exposure		inhalational	
Species		mouse	
Source		ECHA	
Evaluation/classification		Based on available data, the classification criteria are not met.	

Carcinogenicity			
No	Substance name	CAS no.	EC no.
1	norflurane	811-97-2	212-377-0
Route of exposure		inhalational	
Species		rat	
Source		ECHA	
Evaluation/classification		Based on available data, the classification criteria are not met.	

STOT - single exposure			
No data available			

STOT - repeated exposure			
No	Substance name	CAS no.	EC no.
1	norflurane	811-97-2	212-377-0
Route of exposure		inhalational	
Species		rat	
Method		OECD 453	
Source		ECHA	
Evaluation/classification		Based on available data, the classification criteria are not met.	

Aspiration hazard			
No data available			

## 11.2 Information on other hazards

### Endocrine disrupting properties

No data available.

### Other information

No data available.

## SECTION 12: Ecological information

### 12.1 Toxicity

Toxicity to fish (acute)			
No	Substance name	CAS no.	EC no.
1	norflurane	811-97-2	212-377-0
LC50		450	mg/l
Duration of exposure		96	h
Species		Salmo gairdneri	
Method		EU C.1	
Source		ECHA	
Evaluation/classification		Based on available data, the classification criteria are not met.	

Toxicity to fish (chronic)			
No data available			

Toxicity to Daphnia (acute)			
No	Substance name	CAS no.	EC no.
1	norflurane	811-97-2	212-377-0
EC50		980	mg/l
Duration of exposure		48	h
Species		Daphnia magna	
Method		EU C.2	



with 1907/2006/EC

Trade name: R134a

Product no.: R134a

Current version : 2.0.0, issued: 06.04.2023

Replaced version: 1.0.0, issued: 04.02.2022

Region: GB

Source	ECHA
Evaluation/classification	Based on available data, the classification criteria are not met.

**Toxicity to Daphnia (chronic)**

No data available

**Toxicity to algae (acute)**

No data available

**Toxicity to algae (chronic)**

No data available

**Bacteria toxicity**

No data available

**12.2 Persistence and degradability**

Biodegradability			
No	Substance name	CAS no.	EC no.
1	norflurane	811-97-2	212-377-0
Type		aerobic biodegradation	
Value		appr. 3	%
Duration		28	d
Method		OECD 301 D	
Source		ECHA	
Evaluation		not readily biodegradable	

**12.3 Bioaccumulative potential**

Partition coefficient n-octanol/water (log value)			
No	Substance name	CAS no.	EC no.
1	norflurane	811-97-2	212-377-0
log Pow		1.06	
Reference temperature with reference to		25	°C
Method		pH 6.0 OECD 107	
Source		ECHA	

**12.4 Mobility in soil**

No data available.

**12.5 Results of PBT and vPvB assessment**

Results of PBT and vPvB assessment	
PBT assessment	The product is not considered to be a PBT.
vPvB assessment	The product is not considered to be a vPvB.

**12.6 Endocrine disrupting properties**

No data available.

**12.7 Other adverse effects**

Other adverse effects
Global Warming Potential (GWP): 1430

**12.8 Other information**

Other information
Do not discharge product unmonitored into the environment.

**SECTION 13: Disposal considerations****13.1 Waste treatment methods****Product**

dispose of in accordance with local regulation.

Allocation of a waste code number, according to the European Waste Catalogue, should be carried out in agreement with the regional waste disposal company.

Trade name: R134a

Product no.: R134a

Current version : 2.0.0, issued: 06.04.2023

Replaced version: 1.0.0, issued: 04.02.2022

Region: GB

**Packaging**

Compressed gas packaging under pressure. Do not open by force. Do not heat above 50°C. Dispose of compressed gas packagings only if completely discharged. Do not burn empty compressed gas packagings. Do not pierce, cut or weld uncleaned containers.

**SECTION 14: Transport information****14.1 Transport ADR/RID/ADN**

Class	2
Classification code	2A
Hazard identification no.	20
UN number	UN3159
Proper shipping name	1,1,1,2-TETRAFLUOROETHANE (REFRIGERANT GAS R 134a)
Tunnel restriction code	C/E
Label	2.2 RID: (+13)

**14.2 Transport IMDG**

Class	2.2
UN number	UN3159
Proper shipping name	1,1,1,2-TETRAFLUOROETHANE (REFRIGERANT GAS R134a)
EmS	F-C, S-V
Label	2.2

**14.3 Transport ICAO-TI / IATA**

Class	2.2
UN number	UN3159
Proper shipping name	1,1,1,2-Tetrafluoroethane
Label	2.2

**14.4 Other information**

No data available.

**14.5 Environmental hazards**

Information on environmental hazards, if relevant, please see 14.1 - 14.3.

**14.6 Special precautions for user**

To be transported always in closed, upright and safe containers. Make sure that persons handling these containers are aware of the rules of conduct in case of incident or spillage.

**14.7 Maritime transport in bulk according to IMO instruments**

Not relevant

**SECTION 15: Regulatory information****15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture****EU regulations****Regulation (EC) No 1907/2006 (REACH) Annex XIV (List of substances subject to authorisation)**

In accordance with the REACH regulation (EC) 1907/2006, the product does not contain any substances that are considered as subject to listing in annex XIV, inventory of substances requiring authorisation.

**REACH candidate list of substances of very high concern (SVHC) for authorisation**

In accordance with article 57 and article 59 of the Reach regulation (EC) 1907/2006, this substance is not considered as subject to listing in annex XIV, inventory of substances requiring authorisation ("Authorization list").

**Regulation (EC) No 1907/2006 (REACH) Annex XVII: RESTRICTIONS ON THE MANUFACTURE, PLACING ON THE MARKET AND USE OF CERTAIN DANGEROUS SUBSTANCES, MIXTURES AND ARTICLES**

The substance is not subject to the provisions of annex XVII (restriction entries) of the Reach regulation (EC) 1907/2006.

**Directive 2012/18/EU on the control of major-accident hazards involving dangerous substances**

This substance is not subject to Part 1 or 2 of Annex I

**Trade name:** R134a

**Product no.:** R134a

**Current version :** 2.0.0, issued: 06.04.2023

**Replaced version:** 1.0.0, issued: 04.02.2022

**Region:** GB

### Other regulations

REGULATION (EU) No 517/2014 on fluorinated greenhouse gases

Adhere to the national sanitary and occupational safety regulations when using this product.

## 15.2 Chemical safety assessment

A chemical safety assessment has been carried out for this substance.

## SECTION 16: Other information

### Sources of key data used to compile the data sheet:

Regulation (EC) No 1907/2006 (REACH), 1272/2008 (CLP) as amended in each case.

Directives 2000/39/EC, 2006/15/EC, 2009/161/EU, (EU) 2017/164.

National Threshold Limit Values of the corresponding countries as amended in each case.

Transport regulations according to ADR, RID, IMDG, IATA as amended in each case.

The data sources used to determine physical, toxic and ecotoxic data, are indicated directly in the corresponding section.

### Creation of the safety data sheet

UMCO GmbH

This information is based on our present knowledge and experience.

The safety data sheet describes products with a view to safety requirements.

It does not however, constitute a guarantee for any specific product properties and shall not establish a legally valid contractual relationship.

### Alterations/supplements:

Alterations to the previous edition are marked in the left-hand margin.

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