

Product:

Refrigerant R134a

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SDS No.: 000941-001 (Version 6.0)

Date 17.04.2018 (Cancel and replace : 27.03.2017)

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Identification of the product

Substance name:

REACH Registration Name: Norflurane

REACH Registration Number: 01-2119459374-33-0001

EC Nr: 212-377-0

CAS-No.: 811-97-2

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

Use of the Substance/Mixture :

Sector of use :	Product category :
SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites, SU 10: Formulation, SU17: General manufacturing, e.g. machinery, equipment, vehicles, other transport equipment, SU12: Manufacture of plastics products, including compounding and conversion, SU 22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen), SU20: Health services, SU19: Building and construction work	PC0: Refrigerant, PC16: Heat transfer fluids, PC21: Laboratory chemicals, PC0: Blowing agent

1.3. Details of the supplier of the safety data sheet

Supplier

SCHIESSL POLSKA Sp. z o.o.
ul. Karczkowska 46
02-871 Warszawa
POLAND

Telephone: +48 22 750 42 95
Telefak: +48 22 750 42 96
E-mail address: schiessl@schiessl.pl
www.schiessl.pl

1.4. Emergency telephone number

+48 22 750 42 94
European emergency phone number: 112

2. HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

Classification (REGULATION (EC) No 1272/2008):

Gases under pressure, LG, H280

Additional information:

For the full text of the H, EUH-phrases mentioned in this Section, see Section 16.

2.2. Label elements

Label elements (REGULATION (EC) No 1272/2008):

EC Nr : 212-377-0

Hazard
pictograms:



Signal word:

Warning

Hazard statements:

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

Precautionary statements:

Storage:

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

Special labelling:

Contains fluorinated greenhouse gases covered by the Kyoto Protocol. Contains: 1,1,1,2-Tetrafluoroethane.

2.3. Other hazards

Potential health effects:

Ejection of liquefied gas : frostbite possible

Inhalation: At high vapour/fog concentrations : Loss of consciousness Cardiac rhythm problems

Environmental Effects:

Not readily biodegradable. Not bioaccumulable

Physical and chemical hazards:

Decomposition gives toxic and corrosive products

The gaseous product in presence of air can form, under certain conditions of temperature and pressure, a flammable mixture

Decomposition products: See chapter 10

Other:

Results of PBT and vPvB assessment : According to REACH regulation, annex XIII, the substance does not meet PBT and vPvB criteria.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1. Substances

Halogenated hydrocarbon

Chemical name ¹	EC-No.	CAS-No.	Concentration	Classification REGULATION (EC) No 1272/2008
1,1,1,2-Tetrafluoroethane	212-377-0	811-97-2	>= 99,9 %	Press. GasLG; H280

¹: See chapter 14 for Proper Shipping Name

4. FIRST AID MEASURES

4.1. Description of necessary first-aid measures:

General advice:

No hazards which require special first aid measures.

Inhalation:

Move patient from contaminated area to fresh air. In case of persistent problems : Oxygen or artificial respiration if needed. Consult a physician.

Skin contact:

Frostbite : treat as thermal burns.

Eye contact:

Wash immediately, abundantly and thoroughly with water. If irritation persists, consult an ophthalmologist.

Ingestion:

No hazards which require special first aid measures.

Protection of first-aiders:

In case of insufficient ventilation, wear suitable respiratory equipment.

4.2. Most important symptoms/effects, acute and delayed: No data available.

4.3. Indication of immediate medical attention and special treatment needed, if necessary

Treatment: Do not administer catecholamines (because of the cardiac effect caused by the product).

5. FIREFIGHTING MEASURES

5.1. Extinguishing media

Suitable extinguishing media: Use extinguishing measures to suit surroundings.

5.2. Special hazards arising from the substance or mixture:

The product is not flammable in air under ambient conditions of temperature and pressure. Certain mixtures of the product and air under pressure may be flammable
At high temperature : Thermal decomposition giving toxic and corrosive products : Hydrogen fluoride, Carbon oxides

5.3. Advice for firefighters:

Specific methods:

Cool containers/tanks with water spray. Ensure a system for the rapid emptying of containers. In case of fire nearby, remove exposed containers.

Special protective actions for fire-fighters:

In the event of fire, wear self-contained breathing apparatus. Complete suit protecting against chemicals.

6. ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures:

Evacuate non-essential staff and those not equipped with individual protection apparatus. Ensure adequate ventilation. Avoid contact with skin and eyes and inhalation of vapours. In enclosed areas : ventilate or wear a self-contained breathing apparatus (risk of anoxia). Remove all sources of ignition. Do not smoke.
Prevent further leakage or spillage if you can do so without risk. Evacuate area of all unnecessary personnel. Eliminate all ignition sources. Use Halogen leak detector or other suitable means to locate leaks or check atmosphere. Keep upwind. Evacuate enclosed spaces and disperse gas with floor-level forced-air ventilation. Avoid breathing leaked material. Consult a regulatory specialist to determine appropriate state or local reporting requirements, for assistance in waste characterization and/or hazardous waste disposal and other requirements listed in pertinent environmental permits.

6.2. Environmental precautions:

Do not release into the environment.

6.3. Methods and materials for containment and cleaning up:

Recovery:

Allow to evaporate.

Elimination: See chapter 13

6.4. Reference to other sections: None.

7. HANDLING AND STORAGE

7.1. Precautions for safe handling:

Technical measures/Precautions:

Storage and handling precautions applicable to products: Gases under pressure Liquefied gas
Provide appropriate exhaust ventilation at machinery. Provide showers, eye-baths. Provide water supplies near the point of use. Well ventilate empty vats and tanks before entering.

Safe handling advice:

Prohibit ignition sources and contact with hot surfaces - DO NOT SMOKE.

Hygiene measures:

Avoid contact with skin and eyes and inhalation of vapours. When using do not eat, drink or smoke.
Wash hands after handling. Remove contaminated clothing and protective equipment before entering eating areas.

7.2. Conditions for safe storage, including any incompatibilities:

Keep in a cool, well-ventilated place. Keep away from open flames, hot surfaces and sources of ignition. Keep away from heat and sources of ignition. Do not smoke. Protect full containers from sources of heat to avoid overpressurization. Protect against light. Keep away from direct sunlight.

Storage temperature: < 45 °C

Incompatible products:

Alkaline hydroxides Alkaline earth metals Strong oxidizing agents Finely divided metals

Packaging material:

Recommended: Ordinary steel, Stainless steel

To be avoided: Alloys containing more than 2% of magnesium, Plastic materials

7.3. **Specific end use(s):** None.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. **Control parameters:**

Exposure Limit Values

1,1,1,2-Tetrafluoroethane

Source	Date	Value type	Value (ppm)	Value (mg/m3)	Remarks
WEEL	2010	TWA	1.000	4.240	—
EH40 WEL	12 2011	TWA	1.000	4.240	—

Derived No Effect Level (DNEL):

End Use	Inhalation	Ingestion	Skin contact
Workers	13936 mg/m3 (LT, SE)		
Consumers	2476 mg/m3 (LT, SE)		

LE : Local effects, SE : Systemic effects, LT : Long term, ST : Short term

Predicted No Effect Concentration:

Compartment:	Value:
Fresh water	0,1 mg/l
Marine water	0,01 mg/l
Water (Intermittent release)	1 mg/l
Effects on waste water treatment plants	73 mg/l
Fresh water sediment	0,75 mg/kg dw

8.2. **Exposure controls:**

General protective measures:

Provide sufficient air exchange and/or exhaust in work rooms.

Personal protective equipment:

Respiratory protection:

In case of insufficient ventilation, wear suitable respiratory equipment.

Hand protection:

Leather gloves

Eye/face protection:

Safety glasses with side-shields

Skin and body protection:

Protective clothing (cotton)

Environmental exposure controls:

See chapter 6

9. PHYSICAL AND CHEMICAL PROPERTIES

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

Appearance:

Physical state (20°C):

gaseous

Form:

Liquefied gas

Colour:

colourless

Odour:

No data available.

Olfactory threshold:

No data available.

pH:

Not applicable

Melting point/range :

-108 °C

Boiling point/boiling range :

-26 °C

Flash point:

Not applicable

Evaporation rate:

No data available.

Flammability (solid, gas):

Flammability:

The product is not flammable.

Vapour pressure:

0,574 MPa , at 20 °C

Vapour density:

4,24 kg/m3 , at 20 °C

Density:	1.206 kg/m ³ , at 25 °C 1.102 kg/m ³ , at 50 °C 996 kg/m ³ , at 70 °C
Relative density (Water=1):	1,21 at 20 °C 1,1 at 50 °C
Water solubility:	1 g/l at 25 °C
Partition coefficient: n-octanol/water:	log Kow : 1,06 , at 25 °C (OECD Test Guideline 107)
Auto-ignition temperature:	> 743 °C at 1.013 hPa
Decomposition temperature:	> 370 °C
Viscosity, dynamic:	Not applicable
Explosive properties:	
Explosivity:	Not relevant (due to its chemical structure)
Oxidizing properties:	Not relevant (due to its chemical structure)

9.2. Other data:

Molecular weight:	102 g/mol
Critical point:	Critical pressure: 4,07 MPa, Critical temperature: 101 °C

10. STABILITY AND REACTIVITY

10.1. Reactivity: No data available.

10.2. Chemical stability:

The product is stable at ambient temperature

The gaseous product in presence of air can form, under certain conditions of temperature and pressure, a flammable mixture

10.3. Possibility of hazardous reactions: No data available.

10.4. Conditions to avoid:

Keep away from heat and sources of ignition. Avoid contact with flames and red hot metallic surfaces

10.5. Incompatible materials to avoid:

Alkaline hydroxides, Alkaline earth metals, Strong oxidizing agents, Finely divided metals

10.6. Hazardous decomposition products:

Thermal decomposition:

Decomposition temperature: > 370 °C

At high temperature :, Thermal decomposition giving toxic and corrosive products :, Gaseous hydrogen fluoride (HF)., Carbon oxides

11. TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects:

Acute toxicity:

Inhalation:	Slightly harmful by inhalation As with other volatile aliphatic halogenated compounds, through vapour accumulation and/or inhalation of large quantities, the product can cause :, Loss of consciousness and cardiac disorders aggravated by stress and lack of oxygen, risk of mortality
• In animals :	No mortality/4 h/Rat: 567000 ppm (Method: OECD Test Guideline 403) Central nervous system depression, narcosis

Local effects (Corrosion / Irritation / Serious eye damage):

Skin contact:	Ejection of liquefied gas : frostbite possible
Eye contact:	Ejection of liquefied gas : frostbite possible

Respiratory or skin sensitisation:

Inhalation:	
• In animals :	No-observed-effect level 5 % (cardiac sensitization, Dog)
Skin contact:	Not a skin sensitizer
• In animals :	No effect is reported. (Method: Guinea pig maximization test, Guinea pig)

CMR effects :

Mutagenicity:	According to available experimental data: Not genotoxic
In vitro	Ames test in vitro: Inactive (Method: OECD Test Guideline 471) In vitro chromosomal abnormality test on human lymphocytes: Inactive (Method: OECD Test Guideline 473) In vitro gene mutations test on mammalian cells: Inactive
In vivo	Micronucleus test in vivo mouse: Inactive (Method: OECD Test Guideline 474) DNA repair test on rats hepatocytes: Inactive
Carcinogenicity:	Did not show carcinogenic or mutagenic effects in animal experiments.
• In animals :	Absence of carcinogenic effects (Rat, 2 years, By inhalation) No Observed Adverse Effect Level (NOAEL): 10.000 ppm Absence of carcinogenic effects (Rat, 1 year, By oral route) No Observed Adverse Effect Level (NOAEL): 300 mg/kg bw/day

Reproductive toxicity:

Fertility:	Absence of toxic effects on fertility
• In animals :	Two-generation study NOAEL (Parental toxicity): 50.000 ppm NOAEL (Fertility): 50.000 ppm NOAEL (Developmental Toxicity): 50000 ppm (rat, By inhalation)
Foetal development:	Absence of toxic effects for foetal development (at non toxic concentrations for the mothers)
• In animals :	Absence of toxic effects for foetal development. NOAEL (Developmental Toxicity): 40.000 ppm NOAEL (Maternal Toxicity): 2.500 ppm (Method: OECD Test Guideline 414, Rabbit, By inhalation) Absence of toxic effects for foetal development. NOAEL (Developmental Toxicity): 50.000 ppm NOAEL (Maternal Toxicity): 50.000 ppm (Method: OECD Test Guideline 414, Rat, By inhalation)

Specific target organ toxicity :

Single exposure :	No data available.
Repeated exposure:	Studies of prolonged inhalation in animals have not shown chronic toxic effects
• In animals :	Inhalation: No adverse effects reported. NOAEL= 50000ppm (Rat, Several years)

Aspiration hazard:

Not relevant

12. ECOLOGICAL INFORMATION

Ecotoxicology Assessment: All available and relevant data on this product and/or the components quoted in section 3 and/or the analogue substances/metabolites have been taken into account for the hazard assessment.

12.1. Acute toxicity :

Fish:	Slightly harmful to fish LC50, 96 h (Salmo gairdneri) : 450 mg/l (Method: OECD Test Guideline 203)
Aquatic invertebrates:	Slightly harmful to daphnia EC50, 48 h (Daphnia magna (Water flea)) : 980 mg/l (Method: OECD Test Guideline 202)
Aquatic plants:	Slightly harmful to algae May be considered as comparable to a similar product for which experimental results are:
PROPANE, 1,1,1,3,3-PENTAFLUORO- :	ErC50, 72 h (Pseudokirchneriella subcapitata) : > 118 mg/l (Method: OECD Test Guideline 201)
Microorganisms:	EC10, 6 h (Pseudomonas putida) : > 730 mg/l

12.2. Persistence and degradability :

Biodegradation (In water):	Not readily biodegradable. Not readily biodegradable.: 3 % after 28 d (Method: OECD Test Guideline 301D)
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Photodegradation (In air):

Degradation by radicals OH: Direct photolysis (Half-life) : 9,7 y

12.3. Bioaccumulative potential :

Bioaccumulation:

Bioaccumulation is unlikely.

Partition coefficient: n-octanol/water: log Kow : 1,06 , at 25 °C (Method: OECD Test Guideline 107)

12.4. Mobility in soil - Distribution among environmental compartments:

Distribution among environmental compartments :

Predicted distribution to environmental compartments

Water: 0,07 %

Air: 99,93 %

(Method: Calculation according Mackay, Level I)

Vapor pressure:

0,574 MPa, 20 °C

Absorption / desorption:

Slight adsorption

log Koc: 1,57 (Method: calculated)

12.5. Results of PBT and vPvB assessment :

According to REACH regulation, annex XIII, the substance does not meet PBT and vPvB criteria.

12.6. Other adverse effects:

Global warming potential (GWP):

Global warming potential with respect to CO₂ (time horizon 100 years) , Value: 1.360

Ozone depletion potential:

Ozone depletion potential; ODP; (R-11 = 1) , Value: 0

13. DISPOSAL CONSIDERATIONS

13.1. Waste treatment:

Disposal of product:

Recycle or incinerate at an approved waste disposal site. In accordance with local and national regulations.

14. TRANSPORT INFORMATION

Regulation	14.1. UN number	14.2. UN proper shipping name	14.3. Class*	Label	14.4. PG*	14.5. Environmental hazards	14.6. Special precautions for user
ADR	3159	1,1,1,2-TETRAFLUOROETHANE (REFRIGERANT GAS R 134a)	2	2.2		no	
ADN	3159	1,1,1,2-TETRAFLUOROETHANE (REFRIGERANT GAS R 134a)	2	2.2		no	
RID	3159	1,1,1,2-TETRAFLUOROETHANE (REFRIGERANT GAS R 134a)	2	2.2		no	
IATA Cargo	3159	1,1,1,2-tetrafluoroethane (Refrigerant gas R 134a)	2.2	2.2		no	
IATA Passenger	3159	1,1,1,2-tetrafluoroethane (Refrigerant gas R 134a)	2.2	2.2		no	
IMDG	3159	1,1,1,2-TETRAFLUOROETHANE	2.2	2.2		no	EmS Number: F-C, S-V

*Description:

14.3. Transport hazard class(es)

14.4. Packing group

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code: Not applicable

15. REGULATORY INFORMATION

Safety data sheets: accordance with Annex II of Regulation (EC) No 1907/2006 and its amendment(s)

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

Listed in:

EU. Regulation No. 842/2006 on certain fluorinated greenhouse gases, Annex 1. OJ (L 161) 1: Norflurane

Regulation (EC) No 1005/2009 on substances that deplete the ozone layer: Norflurane

Kyoto Protocol to the United Nations Framework Convention on Climate Change, Annex A, Greenhouse Gases: Norflurane

Additional regulations (European Union) :

Hazardous Waste Regulations 2005
UK REGULATION

Applies
Chip3: Chemical (Hazard Information and Packaging for Supply) Regulations 2002

15.2. Chemical safety assessment:

As the substance doesn't meet the criteria for health and environment classification and is neither PBT nor vPvB, according to REACH regulation, article 14(3), development of specific exposure scenarios are not required.

INVENTORIES:

EINECS:	Conforms to
TSCA:	Conforms to
DSL:	All components of this product are on the Canadian DSL
IECSC (CN):	Conforms to
ENCS (JP):	Does not conform
ISHL (JP):	Does not conform
KECI (KR):	Conforms to
PICCS (PH):	Conforms to
AICS:	Conforms to
NZIOC:	Conforms to

16. OTHER INFORMATION

Full text of H, EUH-phrases referred to under sections 2 and 3

H280 Contains gas under pressure; may explode if heated.

Bibliography Encyclopédie des gaz (Air liquide - Ed. 1976 - ELSEVIER AMSTERDAM)

Update:

Safety datasheet sections which have been updated:		Type:
2	Classification and labelling	Revisions
12	12. ECOLOGICAL INFORMATION	Revisions

Thesaurus:

NOAEL : No Observed Adverse Effect Level (NOAEL)
LOAEL : Lowest Observed Adverse Effect Level (LOAEL)
bw : Body weight
food : oral feed
dw : Dry weight
vPvB : very Persistent and very Bioaccumulative
PBT : Persistent, Bioaccumulative and Toxic

This information applies to the PRODUCT AS SUCH and conforming to specifications of manufacturer. In case of formulations or mixtures, it is necessary to ascertain that a new danger will not appear. The information contained is based on our knowledge of the product, at the date of publishing and it is given quite sincerely. Users are advised of possible additional hazards when the product is used in applications for which it was not intended. This sheet shall only be used and reproduced for prevention and security purposes. The references to legislative, regulatory and codes of practice documents cannot be considered as exhaustive. It is the responsibility of the person receiving the product to refer to the totality of the official documents concerning the use, the possession and the handling of the product. It is also the responsibility of the handlers of the product to pass on to any subsequent persons who will come into contact with the product (usage, storage, cleaning of containers, other processes) the totality of the information contained within this safety data sheet and necessary for safety at work, the protection of health and the protection of environment.

NB: In this document the numerical separator of the thousands is the "." (point), the decimal separator is "," (comma).