

# Safety Data Sheet

## Tetrafluoroethane (R134a)

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SDS reference: ALNOR-133

**Warning**



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

#### 1.1. Product identifier

Trade name : Tetrafluoroethane (R134a)  
SDS no : ALNOR-133  
Chemical description : C2H2F4 (R134a)  
CAS No : 811-97-2  
EC no : 212-377-0  
EC index no : ---  
Registration-No. : 01-2119459374-33  
Chemical formula : C2H2F4

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

Relevant identified uses : Industrial and professional. Perform risk assessment prior to use.  
Test gas/Calibration gas.  
Laboratory use.  
Use as refrigerant.  
Contact supplier for more information on uses.

#### 1.3. Details of the supplier of the safety data sheet

Company identification : AIR LIQUIDE GAS AB (Malmo)  
Lundavagen 151  
212 24 Malmo SWEDEN  
040 - 38 10 00

#### 1.4. Emergency telephone number

No additional information available

### SECTION 2: Hazards identification

#### 2.1. Classification of the substance or mixture

##### Classification according to Regulation (EC) No. 1272/2008 [CLP]

Physical hazards Gases under pressure : Liquefied gas H280

#### 2.2. Label elements

##### Labelling according to Regulation (EC) No. 1272/2008 [CLP]

Hazard pictograms (CLP) :



GHS04

Signal word (CLP) : Warning

Hazard statements (CLP) : H280 - Contains gas under pressure; may explode if heated.

# C2H2F4 (R134a)

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Precautionary statements (CLP)

- Storage : P403 - Store in a well-ventilated place.

## 2.3. Other hazards

: Asphyxiant in high concentrations.  
Contact with liquid may cause cold burns/frostbite.

## SECTION 3: Composition/information on ingredients

### 3.1. Substance

Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP]
C2H2F4 (R134a)	(CAS No) 811-97-2 (EC no) 212-377-0 (EC index no) --- (Registration-No.) 01-2119459374-33	100	Press. Gas (Liq.), H280

Contains no other components or impurities which will influence the classification of the product.

**3.2. Mixture** : Not applicable

## SECTION 4: First aid measures

### 4.1. Description of first aid measures

- Inhalation : Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.
- Skin contact : In case of frostbite spray with water for at least 15 minutes. Apply a sterile dressing. Obtain medical assistance.
- Eye contact : Immediately flush eyes thoroughly with water for at least 15 minutes.
- Ingestion : Ingestion is not considered a potential route of exposure.

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

: In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation.  
In low concentrations may cause narcotic effects. Symptoms may include dizziness, headache, nausea and loss of co-ordination.

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

: None.

## SECTION 5: Firefighting measures

### 5.1. Extinguishing media

- Suitable extinguishing media : Water spray or fog.
- Unsuitable extinguishing media : Do not use water jet to extinguish.

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

- Specific hazards : Exposure to fire may cause containers to rupture/explode.
- Hazardous combustion products : If involved in a fire the following toxic and/or corrosive fumes may be produced by thermal decomposition: Carbon monoxide. Hydrogen fluoride. Carbonyl fluoride.

### 5.3. Advice for firefighters

- Specific methods : Use fire control measures appropriate for the surrounding fire. Exposure to fire and heat radiation may cause gas receptacles to rupture. Cool endangered receptacles with water spray jet from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems.
- If possible, stop flow of product.
- Use water spray or fog to knock down fire fumes if possible.
- Move containers away from the fire area if this can be done without risk.
- Special protective equipment for fire fighters : Use self-contained breathing apparatus.
- Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters.
- Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.
- Standard EN 469 - Protective clothing for firefighters. Standard - EN 659: Protective gloves for firefighters.

## SECTION 6: Accidental release measures

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

- : Try to stop release.
- Evacuate area.
- Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe.
- Ensure adequate air ventilation.
- Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.
- Act in accordance with local emergency plan.
- Stay upwind.

### 6.2. Environmental precautions

- : Try to stop release.

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

- : Ventilate area.

### 6.4. Reference to other sections

- : See also sections 8 and 13.

## SECTION 7: Handling and storage

### 7.1. Precautions for safe handling

- Safe use of the product : Do not breathe gas.
- Avoid release of product into atmosphere.
- The substance must be handled in accordance with good industrial hygiene and safety procedures.
- Only experienced and properly instructed persons should handle gases under pressure.
- Consider pressure relief device(s) in gas installations.
- Ensure the complete gas system was (or is regularly) checked for leaks before use.
- Do not smoke while handling product.
- Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt.

Safe handling of the gas receptacle : Refer to supplier's container handling instructions.

Do not allow backfeed into the container.

Protect cylinders from physical damage; do not drag, roll, slide or drop.

When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders.

Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use.

If user experiences any difficulty operating cylinder valve discontinue use and contact supplier.

Never attempt to repair or modify container valves or safety relief devices.

Damaged valves should be reported immediately to the supplier.

Keep container valve outlets clean and free from contaminants particularly oil and water.

Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment.

Close container valve after each use and when empty, even if still connected to equipment.

Never attempt to transfer gases from one cylinder/container to another.

Never use direct flame or electrical heating devices to raise the pressure of a container.

Do not remove or deface labels provided by the supplier for the identification of the cylinder contents.

Suck back of water into the container must be prevented.

### 7.2. Conditions for safe storage, including any incompatibilities

: Observe all regulations and local requirements regarding storage of containers.

Containers should not be stored in conditions likely to encourage corrosion.

Container valve guards or caps should be in place.

Containers should be stored in the vertical position and properly secured to prevent them from falling over.

Stored containers should be periodically checked for general condition and leakage.

Keep container below 50°C in a well ventilated place.

Store containers in location free from fire risk and away from sources of heat and ignition.

Keep away from combustible materials.

### 7.3. Specific end use(s)

: None.

## SECTION 8: Exposure controls/personal protection

### 8.1. Control parameters

Tetrafluoroethane (R134a) (811-97-2)		
OEL : Occupational Exposure Limits		
Sweden	TWA (SV) OEL 8h [mg/m <sup>3</sup> ]	2000 mg/m <sup>3</sup>
	TWA (SV) OEL 8h [ppm]	500 ppm
	STEL (SV) OEL 15min [mg/m <sup>3</sup> ]	3000 mg/m <sup>3</sup>
	STEL (SV) OEL 15min [ppm]	750 ppm

Tetrafluoroethane (R134a) (811-97-2)	
DNEL: Derived no effect level (Workers)	
Long-term - systemic effects, inhalation	14000 mg/m <sup>3</sup>

Tetrafluoroethane (R134a) (811-97-2)	
PNEC: Predicted no effect concentration	
Aqua (freshwater)	0.1 mg/l
Aqua (marine water)	0.01 mg/l
Aquatic, intermittent releases	1 mg/l
Sediment, freshwater	0.75 mg/kg dwt
Micro-organisms or PNEC sewage treatment plant (STP)	73 mg/l

**8.2. Exposure controls****8.2.1. Appropriate engineering controls**

- : Provide adequate general and local exhaust ventilation.
- Systems under pressure should be regularly checked for leakages.
- Ensure exposure is below occupational exposure limits (where available).
- Oxygen detectors should be used when asphyxiating gases may be released.
- Consider work permit system e.g. for maintenance activities.

**8.2.2. Individual protection measures, e.g. personal protective equipment**

- : A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk. The following recommendations should be considered:
- Protect eyes, face and skin from liquid splashes.
- PPE compliant to the recommended EN/ISO standards should be selected.

## • Eye/face protection

- : Wear safety glasses with side shields.
- Wear safety glasses with side shields or goggles when transfilling or breaking transfer connections.
- Standard EN 166 - Personal eye-protection.

## • Skin protection

## - Hand protection

- : Wear working gloves when handling gas containers.
- Standard EN 388 - Protective gloves against mechanical risk.

## - Other

- : Wear safety shoes while handling containers.
- Standard EN ISO 20345 - Personal protective equipment - Safety footwear.

## • Respiratory protection

- : Self contained breathing apparatus (SCBA) or positive pressure airline with mask are to be used in oxygen-deficient atmospheres.
- Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.

## • Thermal hazards

- : None necessary.

**8.2.3. Environmental exposure controls**

- : Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment.

**SECTION 9: Physical and chemical properties****9.1. Information on basic physical and chemical properties**

## Appearance

- Physical state at 20°C / 101.3kPa : Gas
- Colour : Colourless.

Odour : Ethereal.

Odour threshold : Odour threshold is subjective and inadequate to warn of overexposure.

pH : Not applicable.

Melting point / Freezing point : -101 °C

Boiling point : -26.1 °C

Flash point : Not applicable for gases and gas mixtures.

Evaporation rate : Not applicable for gases and gas mixtures.

Flammability (solid, gas) :

Explosive limits : Non flammable.

Vapour pressure [20°C] : 4.7 bar(a)

Vapour pressure [50°C] : 13.2 bar(a)

Relative density, gas (air=1) : 3.6

Water solubility	: 1930 mg/l
Partition coefficient n-octanol/water (Log Kow)	: 0.94
Auto-ignition temperature	: Not applicable.
Viscosity	: Not applicable.
Explosive properties	: Not applicable.
Oxidising properties	: None.

**9.2. Other information**

Molar mass	: 102 g/mol
Critical temperature [°C]	: 101 °C
Other data	: Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

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

: No reactivity hazard other than the effects described in sub-sections below.

**10.2. Chemical stability**

: Stable under normal conditions.

**10.3. Possibility of hazardous reactions**

: None.

**10.4. Conditions to avoid**

: None under recommended storage and handling conditions (see section 7).

**10.5. Incompatible materials**: Moisture.  
For additional information on compatibility refer to ISO 11114.**10.6. Hazardous decomposition products**

: Under normal conditions of storage and use, hazardous decomposition products should not be produced.

**SECTION 11: Toxicological information****11.1. Information on toxicological effects****Acute toxicity** : Classification criteria are not met.

LC50 inhalation rat (ppm) | 567000 ppm/4h

<b>Skin corrosion/irritation</b>	: No known effects from this product.
<b>Serious eye damage/irritation</b>	: No known effects from this product.
<b>Respiratory or skin sensitisation</b>	: No known effects from this product.
<b>Germ cell mutagenicity</b>	: No known effects from this product.
<b>Carcinogenicity</b>	: No known effects from this product.
<b>Toxic for reproduction : Fertility</b>	: No known effects from this product.
<b>Toxic for reproduction : unborn child</b>	: No known effects from this product.
<b>STOT-single exposure</b>	: No known effects from this product.
<b>STOT-repeated exposure</b>	: No known effects from this product.
<b>Aspiration hazard</b>	: Not applicable for gases and gas mixtures.

**SECTION 12: Ecological information****12.1. Toxicity**

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Assessment : Classification criteria are not met.

EC50 48h - Daphnia magna [mg/l] : 930 mg/l

EC50 72h - Algae [mg/l] : No data available.

LC50 96 h - Fish [mg/l] : 450 mg/l

## **12.2. Persistence and degradability**

Assessment : Not readily biodegradable.

## **12.3. Bioaccumulative potential**

Assessment : Not expected to bioaccumulate due to the low log Kow (log Kow < 4).  
Refer to section 9.

## **12.4. Mobility in soil**

Assessment : Because of its high volatility, the product is unlikely to cause ground or water pollution.

## **12.5. Results of PBT and vPvB assessment**

Assessment : Not classified as PBT or vPvB.

## **12.6. Other adverse effects**

Effect on ozone layer : None.

Global warming potential [CO<sub>2</sub>=1] : 1300

Effect on the global warming : When discharged in large quantities may contribute to the greenhouse effect.  
Contains Fluorinated greenhouse gases covered by the Kyoto protocol.

## **SECTION 13: Disposal considerations**

### **13.1. Waste treatment methods**

Refer to supplier's waste gas recovery programme.  
Avoid discharge to atmosphere.  
Do not discharge into any place where its accumulation could be dangerous.  
Ensure that the emission levels from local regulations or operating permits are not exceeded.  
Refer to the EIGA code of practice Doc.30 "Disposal of Gases", downloadable at <http://www.eiga.org> for more guidance on suitable disposal methods.

List of hazardous waste codes (from Commission Decision 2001/118/EC) : 14 06 01: Chlorofluorocarbons, HCFC, HFC.

### **13.2. Additional information**

: None.

## **SECTION 14: Transport information**

### **14.1. UN number**

UN-No. : 3159

### **14.2. UN proper shipping name**

Transport by road/rail (ADR/RID) : 1,1,1,2-TETRAFLUOROETHANE (REFRIGERANT GAS R 134A)

Transport by air (ICAO-TI / IATA-DGR) : 1,1,1,2-TETRAFLUOROETHANE

Transport by sea (IMDG) : 1,1,1,2-TETRAFLUOROETHANE (REFRIGERANT GAS R 134a)

### **14.3. Transport hazard class(es)**

**Labelling**

2.2 : Non-flammable, non-toxic gases.

**Transport by road/rail (ADR/RID)**

Class : 2  
 Classification code : 2A  
 Hazard identification number : 20  
 Tunnel Restriction : C/E - Tank carriage : Passage forbidden through tunnels of category C, D and E. Other carriage : Passage forbidden through tunnels of category E

**Transport by air (ICAO-TI / IATA-DGR)**

Class / Div. (Sub. risk(s)) : 2.2

**Transport by sea (IMDG)**

Class / Div. (Sub. risk(s)) : 2.2  
 Emergency Schedule (EmS) - Fire : F-C  
 Emergency Schedule (EmS) - Spillage : S-V

**14.4. Packing group**

Transport by road/rail (ADR/RID) : Not applicable  
 Transport by air (ICAO-TI / IATA-DGR) : Not applicable  
 Transport by sea (IMDG) : Not applicable

**14.5. Environmental hazards**

Transport by road/rail (ADR/RID) : None.  
 Transport by air (ICAO-TI / IATA-DGR) : None.  
 Transport by sea (IMDG) : None.

**14.6. Special precautions for user****Packing Instruction(s)**

Transport by road/rail (ADR/RID) : P200  
 Transport by air (ICAO-TI / IATA-DGR)  
     Passenger and Cargo Aircraft : 200.  
     Cargo Aircraft only : 200.  
 Transport by sea (IMDG) : P200

Special transport precautions : Avoid transport on vehicles where the load space is not separated from the driver's compartment.  
 Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency.  
 Before transporting product containers:  
 - Ensure there is adequate ventilation.  
 - Ensure that containers are firmly secured.  
 - Ensure cylinder valve is closed and not leaking.  
 - Ensure valve outlet cap nut or plug (where provided) is correctly fitted.  
 - Ensure valve protection device (where provided) is correctly fitted.

**14.7. Transport in bulk according to Annex II of MARPOL and the IBC Code**

: Not applicable.

**SECTION 15: Regulatory information**



**15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture****EU-Regulations**

Restrictions on use : None.  
Seveso directive 96/82/EC : Not covered.

**National regulations**

National legislation : Ensure all national/local regulations are observed.  
Kenn-Nr. : 2350

**15.2. Chemical safety assessment**

: A CSA has been carried out.

**SECTION 16: Other information**

Indication of changes : Revised safety data sheet in accordance with commission regulation (EU) No 453/2010.  
Training advice : The hazard of asphyxiation is often overlooked and must be stressed during operator training.  
Further information : This Safety Data Sheet has been established in accordance with the applicable European Union legislation.

DISCLAIMER OF LIABILITY : Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out.  
Details given in this document are believed to be correct at the time of going to press.  
Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted.

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