

**1,1,1,2-Tetrafluoroethane (R 134a)****133****SECTION 1. Identification of the substance/mixture and of the company/undertaking****1.1. Product identifier**

Trade name : 1,1,1,2-Tetrafluoroethane (R 134a)  
SDS Nr : 133  
Chemical description : Tetrafluoroethane (R134a)  
CAS No :811-97-2  
EC No :212-377-0  
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.  
Contact supplier for more uses information. Use as refrigerant.

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

Company identification : AIR LIQUIDE Deutschland GmbH  
Hans-Günther-Sohl-Straße 5  
D-40235 Düsseldorf GERMANY  
Telefon: +49 (0)211 6699-0 - Fax: +49 (0)211 6699-222  
E-Mail address (competent person) : Info.SDB@AirLiquide.de

**1.4. Emergency telephone number**

Emergency telephone number : +49 (0)2151 398668  
- Availability : ( 24 / 7 )

**SECTION 2. Hazards identification****2.1. Classification of the substance or mixture****Hazard Class and Category Code(s), Regulation (EC) No 1272/2008 (CLP)**

• Physical hazards : Gases under pressure - Liquefied gas - Warning - (CLP : Press. Gas) - H280

**Classification EC 67/548 or EC 1999/45**

Classification : Not included in Annex VI.  
No EC labelling required.  
Not classified as dangerous substance / mixture.

**2.2. Label elements****Labelling Regulation EC 1272/2008 (CLP)**

• Hazard pictograms



• Hazard pictograms code : GHS04  
• Signal words : Warning  
• Hazard statements : H280 - Contains gas under pressure; may explode if heated.  
• Precautionary statements  
- Storage : P403 - Store in a well-ventilated place.

**2.3. Other hazards**



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## SECTION 2. Hazards identification (continued)

Other hazards : Contains Fluorinated greenhouse gases covered by the Kyoto protocol.  
Contact with liquid may cause cold burns/frostbite.  
Asphyxiant in high concentrations.

## SECTION 3. Composition/information on ingredients

### 3.1. Substance / 3.2. Mixture

Substance.

Substance name	Content [Vol-%]	CAS No EC No Index No Registration no.	Classification(DSD)	Classification(CLP)
Tetrafluoroethane (R134a)	: 100 %	811-97-2 212-377-0 ----- 01-2119459374-33-	Not classified (DSD/DPD)	Liq. Gas (H280)

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

\* 1: Listed in Annex IV / V REACH, exempted from registration. \* 2: Registration deadline not expired.

\* 3: Registration not required: Substance manufactured or imported &lt; 1t/y

Full text of R-phrases see chapter 16. Full text of H-statements see chapter 16

## 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. Fire-fighting 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 : Carbonyl fluoride. Carbon monoxide. Hydrogen fluoride.



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## SECTION 5. Fire-fighting measures (continued)

### 5.3. Advice for firefighters

- Specific methods** : If possible, stop flow of product.  
Use fire control measures appropriate to 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.  
Use water spray or fog to knock down fire fumes if possible.
- Special protective equipment for fire fighters** : Use self-contained breathing apparatus.  
Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.  
Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters.  
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

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

### 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

- 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** : Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt.  
Do not smoke while handling product.  
Only experienced and properly instructed persons should handle gases under pressure.  
Ensure the complete gas system was (or is regularly) checked for leaks before use.  
The product must be handled in accordance with good industrial hygiene and safety procedures.  
Consider pressure relief device(s) in gas installations.
- Safe handling of the gas receptacle** : Suck back of water into the container must be prevented.  
Refer to supplier's container handling instructions.  
Do not allow backfeed into the container.  
Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment.  
Protect cylinders from physical damage; do not drag, roll, slide or drop.  
Do not remove or deface labels provided by the supplier for the identification of the cylinder contents.  
When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.)



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## SECTION 7. Handling and storage (continued)

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.  
Close container valve after each use and when empty, even if still connected to equipment.  
Never attempt to repair or modify container valves or safety relief devices.  
Keep container valve outlets clean and free from contaminants particularly oil and water.  
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.  
Damaged valves should be reported immediately to the supplier.

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

**Storage** : 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. Stored containers should be periodically checked for general condition and leakage.  
Observe all regulations and local requirements regarding storage of containers.  
Containers should not be stored in conditions likely to encourage corrosion. Containers should be stored in the vertical position and properly secured to prevent toppling. Container valve guards or caps should be in place. Keep away from combustible materials.

### 7.3. Specific end use(s)

: None.

## SECTION 8. Exposure controls/personal protection

### 8.1. Control parameters

**Occupational Exposure Limits**  
**Tetrafluoroethane (R134a)** : AGW (8h) - Germany [mg/m<sup>3</sup>] TRGS 900 : 4200  
: AGW (8h) - Germany [ppm] TRGS 900 : 1000  
: Exceeding factor AGW - Germany TRGS 900 : 8

**DNEL: Derived no effect level (Workers)**  
**Tetrafluoroethane (R134a)** : Inhalation-long term (systemic) [mg/m<sup>3</sup>] : 14000

**PNEC: Predicted no effect concentration**  
**Tetrafluoroethane (R134a)** : Aqua (freshwater) [mg/l] : 0.1  
: Aqua (marine water) [mg/l] : 0.01  
: Aquatic, intermittent releases [mg/l] : 1  
: Sediment, freshwater [mg/kg dw] : 0.75  
: Sewage water treatment plant (STP) [mg/l] : 73

### 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** : Protect eyes, face and skin from liquid splashes.  
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.  
PPE compliant to the recommended EN/ISO standards should be selected.



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## SECTION 8. Exposure controls/personal protection (continued)

- **Eye/face protection** : Wear safety glasses with side shields or goggles when transfilling or breaking transfer connections  
Wear safety glasses with side shields  
Standard EN 166 - Personal eye-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 for overexposure.
  - Molar mass [g/mol]** : 102
  - Melting point [°C]** : -101
  - Boiling point [°C]** : -26.5
  - Critical temperature [°C]** : 101
  - Flash point [°C]** : Not applicable for gases and gas-mixtures.
  - Evaporation rate (ether=1)** : Not applicable for gases and gas-mixtures.
  - Flammability range [vol% in air]** : Non flammable.
  - Vapour pressure [20°C]** : 4.7 bar
  - Relative density, gas (air=1)** : 3.6
  - Solubility in water [mg/l]** : 1930
  - Partition coefficient n-octanol/water [log Pow]** : 0.94
  - Auto-ignition temperature [°C]** : Not applicable.

### 9.2. Other information

- Other data** : Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.



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**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	: No known toxicological effects from this product.
Skin corrosion/irritation	: No known effects from this product.
Serious eye damage/irritation	: No known effects from this product.
Respiratory or skin sensitisation	: No known effects from this product.
Carcinogenicity	: No known effects from this product.
Germ cell mutagenicity	: No known effects from this product.
Reproductive toxicity	: No known effects from this product.
STOT-single exposure	: No known effects from this product.
STOT-repeated exposure	: No known effects from this product.
Aspiration hazard	: Not applicable for gases and gas-mixtures.

**SECTION 12. Ecological information**

**12.1. Toxicity**

EC50 48h - Daphnia magna [mg/l]	: 930
EC50 72h - Algae [mg/l]	: No data available.
LC50-96h - fish [mg/l]	: 450

**12.2. Persistence and degradability**

: Not readily biodegradable.

**12.3. Bioaccumulative potential**

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

**12.4. Mobility in soil**

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

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: Not classified as PBT or vPvB.

**12.6. Other adverse effects**

Effect on ozone layer : None.  
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.  
Global warming potential [CO2=1] : 1300

**SECTION 13. Disposal considerations****13.1. Waste treatment methods**

: Avoid discharge to atmosphere.  
Do not discharge into any place where its accumulation could be dangerous.  
Consult supplier for specific recommendations.  
Refer to the code of practice of EIGA (Doc. 30/10 "Disposal of Gases, downloadable at <http://www.eiga.org>) for more guidance on suitable disposal methods  
List of hazardous waste : 14 06 01: Chlorofluorocarbons, HCFC, HFC.

**13.2. Additional information**

: None.

**SECTION 14. Transport information**

UN number : 3159  
Labelling ADR, IMDG, IATA



: 2.2 : Non flammable, non toxic gas.

**Land transport (ADR/RID)**

H.I. nr : 20  
UN proper shipping name : 1,1,1,2-TETRAFLUOROETHANE (REFRIGERANT GAS R 134A)  
Transport hazard class(es) : 2  
Classification code : 2 A  
Packing Instruction(s) : P200  
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  
Environmental hazards : None.

**Sea transport (IMDG)**

Proper shipping name : 1,1,1,2-TETRAFLUOROETHANE (REFRIGERANT GAS R 134A)  
Class : 2.2  
Emergency Schedule (EmS) - Fire : F-C  
Emergency Schedule (EmS) - Spillage : S-V  
Packing instruction : P200



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IMDG-Marine pollutant : No  
Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not applicable.

**Air transport (ICAO-TI / IATA-DGR)**

Proper shipping name (IATA) : 1,1,1,2-TETRAFLUOROETHANE (REFRIGERANT GAS R 134A)  
Class : 2.2  
Passenger and Cargo Aircraft : Allowed.  
Packing instruction - Passenger and Cargo Aircraft : 200  
Cargo Aircraft only : Allowed.  
Packing instruction - Cargo Aircraft only : 200

**Special precautions for user**

: - Ensure there is adequate ventilation.  
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 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.  
Avoid transport on vehicles where the load space is not separated from the driver's compartment.

**SECTION 15. Regulatory information****15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture****EU legislation**

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

**National legislation**

: Ensure all national/local regulations are observed.  
- 4. BlmschV (Germany)  
- Water hazard class (WGK) : WGK Germany: 1 - Low hazard to waters.  
- Other regulations and technical rules : [German regulations]  
BetriebssicherheitsV mit TRBSen insbesondere TRBS 3145 / TRGS 725 "Ortsbewegliche Druckgasbehälter", TRGS 2141, BGR Regel 500 Teil 2.33: "Umgang mit Gasen", GefahrstoffV mit Technischen Regeln Gefährliche Stoffe TRGS insbesondere TRGS 407 "Tätigkeiten mit Gasen - Gefährdungsbeurteilung", TRGS 400, 500, 510, 900.

**15.2. Chemical safety assessment**

: A Chemical safety assessment (CSA) has been carried out for this product.





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**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.
- List of full text of H-statements in section 3.** : H280 - Contains gas under pressure; may explode if heated.
- Note** : 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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