

SAFETY DATA SHEET

Refrigerant R1234yf

Version 1.0

Revision Date: 21.02.2013



SAFETY DATA SHEET REFRIGERANT R1234yf

SECTION 1: IDENTIFICATION OF THE SUBSTANCE / PREPARATION AND OF THE COMPANY / UNDERTAKING

1.1. Product Identifier

Product name: REFRIGERANT R1234yf
Synonyms: HFO-1234yf, 2,3,3,3-Tetrafluoroprop-1-ene, Solstice yf Refrigerant
REACH Registration Number: 01-0000019665-61

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

Use: Refrigerant
Advised Against: No identified use advised against

1.3. Details of the supplier of the safety data sheet

Company name: National Refrigerants Ltd.
4 Watling Close
Sketchley Meadows Business Park
Hinckley LE10 3EZ
Tel: +44(0)1455 630790
Fax: +44(0) 1455 630791
Email: sds@nationalref.com

1.4. Emergency telephone number

Emergency Tel: +44(0) 1865 407333 (24 hr. / 7 day week English only)

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification

REGULATION (EC) No 1272/2008 Flammable gases 1
H220: Extremely Flammable Gas.
Gases under pressure. Liquefied gas
H280: Contains gas under pressure; may explode if heated.

DIRECTIVES 67/548/EEC or 1999/45/EC F+ Extremely flammable
R12: Extremely flammable

2.2. Label elements

Regulation (EC) No. 1272/2008

Hazard Pictogram:



Signal word: Danger

Hazard statements: H220: Extremely Flammable
H280: Contains gas under pressure; may explode if heated

Precautionary statements: P281: Use personal protective equipment as required
P210: Keep away from heat/sparks/open flames/hot surfaces. – No smoking
P260: Do not breathe dust/fume/gas/mist/vapour/spray.
P308+P313: If exposed or concerned: Get medical advice/attention.
P410+P403: Protect from sunlight. Store in a well-ventilated place.

Directives 67/548/EEC or 1999/45/EC

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Symbol(s):
R-phrase(s): R12: Extremely flammable.
S-phrase(s): S9: Keep container in a well-ventilated place.
S16: Keep away from sources of ignition – No smoking.

2.3. Potential health effects

Skin: Rapid evaporation of the liquid may cause frostbite.
Eyes: May irritate eyes
Ingestion: Unlikely route of exposure.

2.4. Potential environmental effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

SECTION 3: COMPOSITION / INFORMATION ON INGREDIENTS

3.1. Chemical Characterisation

Chemical Name: 2,3,3,3-Tetrafluoro-1-ene
CAS No. 754-12-1
EC No. 468-710-7
Registration Number 01-0000019665-61
Occupational Exposure Limit(s), if available are listed in section 8.
For the full text of the R-phrases/H-statements mentioned in this section, see Section 16.

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

General Advice: First aider needs to protect himself. Take off all contaminated clothing 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. Wash contaminated clothing before re-use. Consult a physician.

Eye contact: Protect unharmed eye. Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Call a physician immediately.

Ingestion: Rinse mouth. Call a physician immediately.

Inhalation: When inhaled remove to fresh air and seek medical aid. If breathing is irregular or stopped administer artificial respiration. If unconscious place in recovery position and seek medical advice.

Further Information: Adrenaline derivatives are contra-indicated. Treat symptomatically.
See section 11 for more detailed information on health effects and symptoms.

SECTION 5: FIRE-FIGHTING MEASURES

5.1. Extinguishing media

Extinguishing media: Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2. Special hazards arising from the substance or mixture

Special hazards during fire fighting: Extremely flammable.
Some risk may be expected of corrosive and toxic decomposition products as result of fire such as: Carbon monoxide, Hydrogen halides, Carbonyl halides, Pyrolysis products containing fluoride.
Cool closed containers exposed to fire with water spray.
Heating will cause pressure rise with risk of bursting and subsequent explosion.

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5.3. Advice for fire-fighters

Advice for fire-fighters: Wear full protective clothing and self-contained breathing apparatus.

Further Information: In case of fire: Evacuate area. Fight fire remotely due to the risk of explosion.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Personal precautions: Wear full protective clothing and self-contained breathing apparatus. Keep people away from and upwind of spill/leak.
Ventilate the area.

6.2. Environmental precautions

Environmental precautions: The product evaporates readily. Prevent product from entering drains.

6.3. Methods and material for containment and cleaning up

Clean-up procedures: Use low-sparking hand tools and explosion-proof electrical equipment. Allow to evaporate.

Additional advice: Inform the responsible authorities in case of gas leakage, or of entry into waterways, soil or drains. Pay attention to the spreading of gases especially at ground level (heavier than air) and to the direction of the wind.

6.4. Reference to other sections

Reference to other sections: For personal protection see section 8.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Handling requirements: Exhaust ventilation of the equipment area is necessary.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions: Keep containers tightly closed in a cool, well-ventilated place
Containers must be protected from falling down.
Protect from heat, do not store at temperature exceeding 50°C.
Pressurized container: protect from sunlight and do not expose to temperatures exceeding 50°C.
Do not pierce or burn, even after use.
Use suitably rated equipment.

Suitable packaging: Store in original cylinders only.

7.3. Specific end use(s)

Specific end use(s)

SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1. Control parameters

Hazardous ingredients:

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Workplace exposure limits

Component	Basis	Value Type	Control Parameters	Exceeding Factor	Form of Exposure	Remarks
2,3,3,3-Tetrafluoroprop-1-ene	WEL	TWA	500 ppm			We are not aware of any national exposure limit

8.2. Exposure controls

Engineering measures:	Use ejective exhaust ventilation in equipment area.
Respiratory protection:	In case of insufficient ventilation wear suitable respiratory equipment.
Hand protection:	Wear suitable gloves.
Eye protection:	Goggles.
Skin protection:	Wear suitable protective equipment.
DNEL/PNEC-Values:	No DNEL and PNEC data available.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

State:	Compressed liquefied gas
Colour:	Water clear
Odour:	Slight ethereal odour.
Molecular Weight:	114.04 g/mole
Boiling Point/range:	-29.4°C
Flash Point:	Not applicable
Auto ignition Temperature:	405°C
Upper explosive limit/upper flammability limit:	12.3 % v/v (upper flammability limit)
Lower explosion limit/lower flammability limit:	6.2 % v/v (lower flammability limit)
Vapour pressure:	6.067 hPa at 54.4°C (130°F)
Liquid Density:	1.1 g/cm ³ at 24°C
Vapour Density:	37.9 kg/m ³ at 25°C
Liquid Density:	1091.9 kg/m ³ at 25°C
Water solubility:	198.2 mg/l at 24°C
Vapour Density (Air = 1)	4

SECTION 10. STABILITY AND REACTIVITY

10.1. Conditions to avoid

Conditions to avoid:	Do not pierce or burn, even after use. Do not spray on a naked flame or any incandescent material. Avoid heat, flames and sparks.
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10.2. Incompatible material

Materials to avoid:	Reactions with alkali metals Reactions with light metals. Zinc. Magnesium
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10.63 Hazardous decomposition products

Hazardous decomposition products	Risk of formation of toxic pyrolysis products containing fluorine. Carbon monoxide Carbon dioxide
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Carbonyl halides
Hydrogen halides

SECTION 11: TOXICOLOGICAL INFORMATION

Information on toxicological effects

Acute oral toxicity:	Not applicable
Acute dermal toxicity:	Not applicable
Acute inhalation toxicity:	LC50/rat Value: >400000 ppm Exposure time; 4 hours
Skin irritation:	Slight irritation
Eye irritation:	Slight irritation
Sensitisation:	No data available
Repeated dose toxicity:	Rat, exposure route: inhalation NOEL: 233 mg/kg NOEL: 50000 ppm
Further information:	Concentration above the admissible concentration at the workplace may cause dizziness, headache and inebriation. 2,3,3,3-Tetrafluoroprop-1-ene: Mouse Micronucleus (4-hour): No toxicological significant signs reported. No increase in the frequency of micronuclei. Cardiac sensitisation: no effects for exposures up to 12% (120189 ppm).

SECTION 12. ECOLOGICAL INFORMATION

If section is empty there is no available information.

12.1. Toxicity

Toxicity to fish:	Species: Cyprinus carpio (carp) LC ₅₀ >197 mg/l 96 h Method: OECD test guideline 204 Comment: No demonstrable toxic effect in saturated solution.
Toxicity to Aquatic plants:	Species: Scenedesmus (fresh water algae) EC ₅₀ >100 mg/l
Acute Toxicity to aquatic invertebrates:	Species: Daphnia magna (Water flea) EC ₅₀ >83 mg/l 48h Method: OECD test guideline 202
Further information:	An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

12.2. Persistence and degradability

Persistence and degradability: No data available

12.3. Bio accumulative potential

Bio-accumulative potential: No data available

12.4. Mobility in soil

Mobility: No data available

12.5. Results of PBT and vPvB assessment

PBT identification: No data available

12.6. Other adverse effects

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Other adverse effects: No data available

SECTION 13. DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Product: Dispose according to legal requirements.

Packaging: Legal requirements are to be considered in regard of reuse or disposal of used packing materials.

Further information: Provisions relating to waste: EC Directive 2006/12/EC; 91/689/EEC Regulation No. 1013/2006.
N.B.

SECTION 14. TRANSPORT INFORMATION

14.1. ADR

UN Number: 3161
Proper Shipping Name: Liquefied Gas, Flammable, N.O.S. (2,3,3,3-Tetrafluoroprop-1-ene)
Class/Division: 2F
Tunnel Code: (B/D)
Hazard Identification Number: 23
Labelling ADR: 2.1

14.2. IATA

UN Number: 3161
Proper Shipping Name: Liquefied Gas, Flammable, N.O.S. (2,3,3,3-Tetrafluoroprop-1-ene)
Hazard Label: 2.1

14.3. IMDG

UN Number: 3161
Proper Shipping Name: Liquefied Gas, Flammable, N.O.S. (2,3,3,3-Tetrafluoroprop-1-ene)
Class/Division: 2.1
EmS Number: F-D, F-U
Marine Pollutant: No

SECTION 15. REGULATORY INFORMATION

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

Other inventory information

Country	Legislation	Information
US	Toxic Substances Control Act	On TSCA inventory
Australia	Industrial Chemical (Notification & assessment) Act	Not in compliance with inventory.
Japan	Kashin Hou Law List	On the inventory or in compliance with the inventory.
Korea	Existing Chemical Inventory (KECI)	On the inventory or in compliance with the inventory.
Philippines	The Toxic Substances and Hazardous and Nuclear Waste Control Act	Not in compliance with inventory.
China	Inventory of Existing Chemical Substances	Not in compliance with inventory.
New Zealand	Inventory of Chemicals (NZIoC) as published by ERMA New Zealand	Not in compliance with inventory

15.2. Chemical Safety Assessment

No chemical assessment has been done by the supplier.

16. OTHER INFORMATION

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Other information:

Abbreviations

EC European Community

CAS Chemical Abstract Service

WEL Workplace Exposure Limit

MAK Maximale Arbeitsplatz-Konzentration (Maximum Workplace Concentration)

AGW Arbeitsplatzgrenswert (Workplace Threshold Value)

STEL Short Term Exposure Limit

This safety sheet is prepared in accordance with Commission Regulation (EU) No. 453/2010.

* Indicates text in SDS which has changed since the last revision.

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GENERAL SAFETY & HANDLING DATA

1. GENERAL

Only trained persons should handle compressed gases. Observe all regulations and local requirements regarding the storage of Cylinders.
Do not remove or deface labels provided by the supplier for the identification of the Cylinder contents.
Ascertain the identity of the gas before using it.
Know and understand the properties and hazards associated with each gas before using it.
When doubt exists as to the correct handling procedure for a particular gas contact the supplier.

HANDLING AND USE

Wear stout gloves.
Never lift a Cylinder by the cap or guard unless the supplier states it is designed for that purpose.
Use trolley or other suitable device or technique for transporting heavy Cylinders, even for a short distance.
Where necessary wear suitable eye and face protection.
The choice between safety glasses, chemical goggles, or full face shield will depend on the pressure and nature of the gas being used,

Where necessary for toxic gases see that self-contained positive pressure breathing apparatus or full face airline respirator is available in the vicinity of the working area.
Employ suitable pressure regulating device on all Cylinders when gas is being emitted to systems with lower pressure rating than that of the Cylinder.
Ascertain that all electrical systems in the area are suitable for service with each gas.

Never use direct flame or electrical heating devices to raise the pressure of a Cylinder, Cylinders should not be subjected to temperatures above 45°C.
Never re-compress a gas mixture without consulting the supplier. Never attempt to transfer gases from one Cylinder to another.
Do not use Cylinders as rollers or supports, or for any other purpose other than to contain the gas as supplied.
Never permit oil, grease or other readily combustible substances to come into contact with valves of Cylinders containing oxygen or other oxidants.
Keep Cylinder valves clean and free from contaminants particularly oil and water.

Do not subject Cylinders to mechanical shocks which may cause damage to their valves or safety devices.

Never attempt to repair or modify Cylinder valves or safety relief devices. Damaged valves should be reported immediately to the supplier.
Close the Cylinder valve whenever gas is not required even if the Cylinder is still connected to the equipment.

2. STORAGE

Cylinders should be stored in a well-ventilated area. Some gases will require a purpose built area.
Store Cylinders in a location free from fire risk and away from sources of heat and ignition. Designate as a no smoking area.

Gas Cylinders should be segregated in the storage according to the various categories.

The storage area should be kept clear and access should be restricted to authorized persons only, the area should be clearly marked as a storage area and appropriate hazard warning signs displayed (Flammable, Toxic etc.).

The amount of flammable or toxic gases should be kept to a minimum.

Flammable gases should be stored away from other combustible materials.

Cylinders held in storage should be periodically checked for general condition and leakage.

Cylinders in storage should be properly secured to prevent toppling or rolling.

Vertical storage is recommended where the Cylinder is designed for this.

Cylinder valves should be tightly closed and, where appropriate, valves should be capped or plugged.

Protect Cylinders stored in the open against rusting and extremes of weather.

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

Store full and empty Cylinders separately and arrange full Cylinders so that the oldest stock is used first.

FOR FURTHER INFORMATION CONTACT YOUR NEAREST DISTRIBUTION CENTRE