

SAFETY DATA SHEET
Refrigerant Gas R437A

Version 1
Revision Date: 11.07.2011



SAFETY DATA SHEET
REFRIGERANT R437A

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

1.1. Product Identifier

Product name: REFRIGERANT R437A

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

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance of mixture

Not a hazardous substance or mixture according to EC Directive 67/548/EEC or 1999/45/CE.

2.2. Label elements

Special labelling of certain mixtures: Safety data sheet available on request for professional users.
Contains fluorinated greenhouse gases covered by the Kyoto Protocol
The product does not need to be labelled in accordance with Directive 1999/45/EC or Annex VI to 67/548/EEC.

2.3. Other hazards

Rapid evaporation of the liquid may cause frostbite.
Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.
May cause cardiac arrhythmia.

SECTION 3: COMPOSITION / INFORMATION ON INGREDIENTS

3.2 Mixtures

[R125] PENTAFLUOROETHANE (CAS No. 354-33-6) (EC No. 206-557-8)

Registration Number	Classification according to 67/548/EEC	Classification according to Regulation 1272/2008 (CLP)	Concentration
		Pressurised Gas: H280	17.7 – 20.0%

[R134a] 1,1,1,2-TETRAFLUOROETHANE (CAS No. 811-97-2) (EC No. 212-377-0)

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Registration Number	Classification according to 67/548/EEC	Classification according to Regulation 1272/2008 (CLP)	Concentration
		Pressurised Gas: H280	77.8 – 80.0%

[R601] PENTANE (CAS No. 109-66-0) (EC No. 203-692-4)

Registration Number	Classification according to 67/548/EEC	Classification according to Regulation 1272/2008 (CLP)	Concentration
	F+: R12 Carcinogenicity Cat 1: R45 Mutagenicity Cat. 1: R46	Flammable Gas- Category 1: Danger H220 Pressurised Gas: Warning H280 Germ cell Mutagenicity – Category 1B: Danger H280 Carcinogenicity - Category 1B: Danger H350	0.7 – 0.7%

[R600] N-BUTANE (CAS No. 106-97-8) (EC No. 203-448-7)

Registration Number	Classification according to 67/548/EEC	Classification according to Regulation 1272/2008 (CLP)	Concentration
	F+: R12 N	Flammable Gas- Category 1: Danger H220 Pressurised Gas: Warning H280 Toxic to Aquatic Life with Long lasting Affects: H411	1.2 – 1.5%

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

- General advice:** Never give anything by mouth to an unconscious person. When symptoms persist or in all cases of doubt seek medical advice.
- Inhalation:** Remove from exposure, lie down. Move to fresh air. Keep patient warm and at rest. Artificial respiration and/or oxygen may be necessary. Call a physician.
- Skin contact:** Take off all contaminated clothing immediately if not stuck to the skin. Flush area with lukewarm water. Do not use hot water. If frostbite has occurred call a physician.
- Eye contact:** Hold eyelids apart and flush eyes with plenty of water for at least 15 minutes. Get medical attention.
- Ingestion:** This is not considered a potential route of exposure.

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

- Inhalation:** Causes shortness of breath, dizziness, severe headache, nausea, and unconsciousness.
- Skin contact:** Low exposure will cause redness and pain. High exposure will cause frostbite, blisters and severe pain.
- Eye contact:** Cause severe pain and cornea damage.
- Ingestion:** Not a route of exposure.

Delayed/immediate effects:

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

- Immediate/special treatment:** Burns pack should be available on the premises. Do not give adrenaline or similar drugs.

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SECTION 5: FIRE-FIGHTING MEASURES

5.1. Extinguishing media

Extinguishing media: Water spray, Foam, Dry chemical, Carbon dioxide (CO₂)

5.2. Special hazards arising from the substance or mixture

Special hazards arising from the mixture Vapours are heavier than air and may spread along floors.
Vapours or gases may travel considerable distance to ignition source and flash back.
Fire or intense heat may cause violent rupture of packages.
Hazardous thermal decomposition products: Carbon oxides, Hydrogen fluoride, Carbonyl fluoride, Fluorocarbons.
Exposure to decomposition products may be a hazard to health.

5.3. Advice for fire-fighters

Advice for fire-fighters: In the event of fire wear self-contained breathing apparatus.
Wear neoprene gloves during cleaning work after a fire.

Further information Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Cool containers/tanks with water spray.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Personal precautions: Evacuate personnel to safe areas.
Ventilate the area, especially low or enclosed places where heavy vapours might collect.
Wear self-contained breathing apparatus when entering area unless the atmosphere is proved to be safe.

6.2. Environmental precautions

Environmental precautions: Should not be released into the atmosphere.
Try to stop the release.
Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous..

6.3. Methods and material for containment and cleaning up

Clean-up procedures: Ventilate the area. Material evaporates.

6.4. Reference to other sections

Reference to other sections: Refer to Section 7 of SDS. Refer to Section 8 of SDS.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Handling requirements: *Advice on handling:* Avoid breathing vapours or mist. Avoid liquid contact with skin and clothing. Provide sufficient air exchange and/or exhaust in work rooms.
Advice on protection against fire and explosion: No special measures against fire required.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions: Do not drag, slide or roll cylinders. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder. Store in cool, dry well ventilated place. Temperature not to exceed 52°C. Keep valves tightly closed.

Storage Temperature < 52°C

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Suitable packaging: Store in original cylinder only.
 Protect from contamination.

7.3. Specific end use(s)

Specific end use(s) No data is available.

SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1. Control parameters

If subsection is empty then no values are applicable

Substances with workplace control parameters

[R134a] 1,1,1,2-TETRAFLUOROETHANE (CAS No. 811-97-2)

Type	Control parameters	Update	Basis	Remarks
Form of exposure				
TWA	4 240 mg/m ³ 1 000 ppm	2007	EH40 WEL	

Derived No Effect Level

Pentafluoroethane: Type of Application (Use): Workers
 Exposure routes: Inhalation
 Health Effects: Chronic effects, Systemic toxicity
 Value: 16 444 mg/m³

Type of Application (Use): Consumers
 Exposure routes: Inhalation
 Health Effects: Chronic effects, Systemic toxicity
 Value: 1 753 mg/m³

1,1,1,2-Tetrafluoroethane: Type of Application (Use): Workers
 Exposure routes: Inhalation
 Health Effects: Chronic effects, Systemic toxicity
 Value: 13 936 mg/m³

Type of Application (Use): Consumers
 Exposure routes: Inhalation
 Health Effects: Chronic effects, Systemic toxicity
 Value: 2 476 mg/m³

Predicted No Effect Concentration

Pentafluoroethane: Value: 0.1 mg/l
 Compartment: Fresh water

Value: 1 mg/l
 Compartment: Water
 Remarks: Intermittent use/release

Value: 0.6 mg/l
 Compartment: Fresh water sediment

1,1,1,2-Tetrafluoroethane: Value: 0.1 mg/l
 Compartment: Fresh water

Value: 0.01 mg/l
 Compartment: Marine water

Value: 1 mg/l

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Compartment: Water
Remarks: Intermittent use/release

Value: 0.75 mg/l
Compartment: Fresh water sediment

Value: 73 mg/l
Compartment: Water
Remarks: Sewage treatment plants

8.2. Exposure controls

Engineering measures:	Ensure adequate ventilation, especially in confined areas. Local exhaust should be used when large amounts are released.
Respiratory protection:	For rescue and maintenance work in storage tanks use self-contained breathing apparatus. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.
Hand protection:	Heat insulating gloves
Eye protection:	Safety glasses with side shields. Wear a face shield in addition where the possibility exists for face contact due to splashing, spraying or airborne contact with this material.
Skin and body protection:	Impervious clothing that covers legs and arms.
Environmental:	Gas escapes to be kept to the minimum by engineering processes and operating methods.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

State:	Liquefied gas under pressure.
Colour:	Clear colourless liquid and vapour.
Odour:	Ethereal
Boiling Point/range:	-32°C at 1 Bar (1013 kPa)
Flash Point:	Does not flash
Vapour pressure:	6.3 Bar(a) (12 546 hPa) at 20°C
Liquid Density:	1 197 kg/m ³ at 20°C
Vapour Density:	31.62 kg/m ³ at 20°C
Vapour Density (Air = 1)	3.66

SECTION 10. STABILITY AND REACTIVITY

10.1. Reactivity

Reactivity:	Decomposes on heating.
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10.2. Chemical stability

Chemical stability:	Chemically stable under normal conditions.
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10.3. Possibility of hazardous reactions

Hazardous reactions:	Hazardous reactions will not occur under recommended storage and transport conditions. May react with aluminium.
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10.4. Conditions to avoid

Conditions to avoid:	Heat, hot surfaces, flames.
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10.5. Incompatible material

Materials to avoid:	Alkali metals, alkaline earth metals, powdered metals, powdered metal salts.
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10.6. Hazardous decomposition products

Hazardous decomposition	Thermal decomposition yields toxic products, Carbon oxides, Hydrogen Fluoride, Carbonyl
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products

Fluoride and fluorocarbons, which can be corrosive in the presence of moisture.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Acute oral toxicity: 1,1,1,2-Tetrafluoroethane: Not applicable.
Acute inhalation toxicity: 1,1,1,2-Tetrafluoroethane: LC₅₀/rat: 567 000 ppm /dog: Cardiac sensitization.
Pentafluoroethane: LC₅₀/rat: >800 000 ppm /dog: Cardiac sensitization.
Acute dermal toxicity: 1,1,1,2-Tetrafluoroethane: Not applicable.
Pentafluoroethane: Not applicable.
Skin irritation: 1,1,1,2-Tetrafluoroethane: *Rabbit*
Classification: Not classified as irritant.
Result: Slight irritation.
Not expected to cause skin irritation based on expert review of the Properties of the substance.
Pentafluoroethane: Not tested on animals
Classification: Not classified as irritant.
Result: No skin irritation
Not expected to cause skin irritation based on expert review of the Properties of the substance.

Eye irritation: 1,1,1,2-tetrafluoroethane: *Rabbit*
Classification: Not classified as irritant.
Result: slight irritation
Not expected to cause eye irritation based on expert review of the Properties of the substance.
Human
Classification: Not classified as irritant.
Result: No eye irritation.
Pentafluoroethane: Not tested on animals
Classification: Not classified as irritant.
Result: No eye irritation
Not expected to cause eye irritation based on expert review of the Properties of the substance.

Sensitisation: 1,1,1,2-Tetrafluoroethane: *Guinea pig*
Classification: Not classified as a skin sensitizer.
Result: Did not cause sensitization on laboratory animals.
Not expected to cause sensitization based on expert review of the Properties of the substance.
There are no reports of human respiratory sensitization.
Pentafluoroethane: Not tested on animals
Classification: Not a skin sensitizer.
Result: Does not cause skin sensitization.
Not expected to cause sensitization based on expert review of the Properties of the substance.
There are no reports of human respiratory sensitization.

Repeated dose toxicity: 1,1,1,2-Tetrafluoroethane: Inhalation: rat
No toxicologically significant effects were found.
Pentafluoroethane: Inhalation: rat
No toxicologically significant effects were found.

11.2 Mutagenic assessment

Mutagenicity assessment: 1,1,1,2-Tetrafluoroethane: Animal testing did not show any mutagenic effects.
Tests on bacterial or mammalian cell cultures did not show mutagenic effects.
Pentafluoroethane: Animal testing did not show any mutagenic effects.
Tests on bacterial or mammalian cell cultures did not show mutagenic effects.

11.3 Carcinogenicity assessment

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Carcinogenicity assessment: 1,1,1,2-Tetrafluoroethane: Not classifiable as a human carcinogen.
Pentafluoroethane: Not classifiable as a human carcinogen.

11.4 Toxicity to reproduction

Toxicity to reproduction assessment: 1,1,1,2-Tetrafluoroethane: No toxicity to reproduction.
Pentafluoroethane; No toxicity to reproduction.

11.5 Human experience

Human experience: Excessive exposure may affect human health as follows:
Inhalation: Sever shortness of breath, narcosis, irregular cardiac activity.

11.6 Further information

Further information: Rapid evaporation of the liquid may cause frostbite.
May cause cardiac arrhythmia.

SECTION 12. ECOLOGICAL INFORMATION

12.1. Toxicity

Toxicity to fish: 1,1,1,2-Tetrafluoroethane: LC₅₀/96 h/Oncorhynchus mykiss (rainbow trout): 450 mg/l
Pentafluoroethane: LC₅₀/96 h/Oncorhynchus mykiss (rainbow trout): > 81.8 mg/l
Information given is bases on data obtained from similar Substances.
LC₅₀/96 h/Danio rerio (zebra fish): > 200 mg/l
Information given is bases on data obtained from similar Substances.
LC₅₀/96 h/Oncorhynchus mykiss (rainbow trout): 450 mg/l
Information given is bases on data obtained from similar Substances.

Toxicity to aquatic plants: 1,1,1,2-Tetrafluoroethane: EC₅₀/72 h/Algae: . 118 mg/l
Information given is bases on data obtained from similar Substances.
Pentafluoroethane: EC₅₀/72 h/Pseudokirchneriella subcapitata (green algae):>118mg/l
Information given is bases on data obtained from similar Substances.
EC₅₀/72 h/Pseudokirchneriella subcapitata (green algae):>114mg/l
Information given is bases on data obtained from similar Substances.
EC₅₀/96 h/Algae: 142 mg/l
Information given is bases on data obtained from similar Substances.

Toxicity to aquatic invertebrates: 1,1,1,2-Tetrafluoroethane: EC₅₀/48 h/Daphnia magna (Water flea): 980 mg/l
Pentafluoroethane: EC₅₀/48 h/Daphnia magna (Water flea): > 200 mg/l
Information given is bases on data obtained from similar Substances.
EC₅₀/48 h/Daphnia magna (Water Flea): > 97.9 mg/l
Information given is bases on data obtained from similar Substances.

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

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12.5. Results of PBT and vPvB assessment

PBT identification: No data available

12.6. Other adverse effects

Other adverse effects: Ozone Depletion Potential (ODP): 0 (R11 = 1)
Global Warming Potential (GWP): 1710 (CO₂ = 1)

SECTION 13. DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Disposal operations: Can be used after re-conditioning, in accordance with local and national regulations. Do not allow product to be released into the environment.

Recovery Operations: Consult the manufacturer or supplier for information regarding recovery and recycling of the product. If recovery is not possible, incinerate at a licensed installation.

Disposal of packaging: De-gas and return cylinders to suppliers.

N.B. The user's attention is drawn to the possible existence of regional or national regulations regarding disposal.

SECTION 14. TRANSPORT INFORMATION

14.1. ADR:

ADR Class: 2
Classification code: 2A
HI No.: 20
UN number: 3163
Labelling No.: 2.2
Proper shipping name: LIQUEFIED GAS N.O.S. (1,1,1,2-TETRAFLUOROETHANE, PENTAFLUOROETHANE)
Tunnel restriction code: (C/E)

14.2. IATA_C:

IATA_C: Class: 2
UN number: 3163
Labelling No.: 2.2
Proper shipping name: LIQUEFIED GAS N.O.S. (1,1,1,2-TETRAFLUOROETHANE, PENTAFLUOROETHANE)

14.3. IMDG:

IMDG: Class: 2.2
UN number: 3163
Labelling No.: 2.2
Proper shipping name: LIQUEFIED GAS N.O.S. (1,1,1,2-TETRAFLUOROETHANE, PENTAFLUOROETHANE)

SECTION 15. REGULATORY INFORMATION

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

Special labelling of certain mixtures: Contains fluorinated greenhouse gases covered by the Kyoto Protocol.

15.2. Chemical Safety Assessment

Chemical safety assessment: No data available.

16. OTHER INFORMATION

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Other information:

This SDS adheres to the standards and regulatory requirements of Great Britain and may not meet the regulatory requirements in other countries.

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.

Text of R-phrases mentioned in

Section 3: R12 Extremely flammable.

**Text of H-phrases referred to
under section3:**

H220	Extremely flammable gas
H280	Contains gas under pressure; may explode if heated.
H350	May cause cancer.
H411	Toxic to aquatic life with long lasting effects.

Legal disclaimer: *National Refrigerants Ltd. believes that the information and recommendations contained herein (including data and statements) are accurate as of the date hereof. NO WARRANTY OF FITNESS FOR ANY PARTICULAR PURPOSE, WARRANTY OF MERCHANTABILITY, OR ANY OTHER WARRANTY, EXPRESSED OR IMPLIED, IS MADE CONCERNING THE INFORMATION PROVIDED HEREIN. The information provided herein relates only to the specific product designated and may not be valid where such product is used in combination with any other methods of use of the product and of the information referred to herein are beyond the control of National Refrigerants Ltd. National Refrigerants Ltd. expressly disclaims any and all liability as to any results obtained or arising from any use of the product or reliance on such information.*

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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