

Safety Data Sheet

According to Regulation (EU) No. 1907/2006 (REACH), Annex II

Version: 1.0/EN
Trade name: R407C

Revision date: 28/12/2010
Printing date: 28/12/2010

Section 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Trade name: R407C
Product description: Mixed refrigerant. Mixed of R32, R125 and R-134a.
Retrofited refrigerant for R22.

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

Identified uses: Used as refrigerant.
Uses advised against: No uses advised against.

1.3 Details of the supplier of the SDS

Only Representative: REACH COMPLIANCE SERVICES LIMITED
Address: 306 The Capel Building, Mary's Abbey, Dublin 7, Ireland
E-mail: Info@reach24h.com

Manufacturer: JINHUA YONGHE FLUOROCHEMICAL CO., LTD.
Address: JINXI DEVELOPMENT AREA, JINHUA, ZHEJIANG, CHINA
E-mail: Yonghe_gas8@qhyh.com
Telephone: +86 579 83186711
Fax: +86 579 83186717

Importer:
Address:
E-mail:
Telephone:
Fax:

1.4 Emergency telephone number

+86 579 2660119(China)

Section 2: Hazards identification

2.1 Classification of the substance or mixture

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

Gases under pressure (Liquefied gases); H280

Classification according to Council Directive 1999/45/EEC [DPD]

This product does not meet the criteria for classification in any hazard class according to Directive 67/548/EEC on classification, labelling and packaging of substances.

Additional information

Full text of H-statement(s): see section 16.

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2.2 Label elements

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

Trade name: R407C

Hazard pictogram(s):



GHS04

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.

Supplemental Hazard information (EUH):

No information available.

Special rules for supplemental label elements for certain mixtures:

No information available.

Labelling according to Directive 1999/45/EC

Symbol(s) and Indication(s) of Danger: No pictogram is used.

Risk Phrase: No risk phrase is used. Safety Phrases: No safety phrase is used.

2.3 Other hazards

Fluorinated greenhouse gases, which has climatic warming potential.

Section 3: Composition/information on ingredients

3.1 Substance information

| Substance name | Synonym | CAS No. | EC No. | Molecular formula | Classification according to DSD | % (w/w) |
|-------------------|---------|----------|-----------|-------------------|---------------------------------|---------|
| Norflurane | R134a | 811-97-2 | 212-377-0 | C2H2F4 | - | 52±2 |
| Pentafluoroethane | R125 | 354-33-6 | 206-557-8 | C2HF5 | - | 25±2 |
| Difluoromethane | R32 | 75-10-5 | 200-839-4 | CH2F2 | F; R12 | 23±2 |

| Substance name | Synonym | CAS No. | EC No. | Molecular formula | Classification according to CLP | % (w/w) |
|-------------------|---------|----------|-----------|-------------------|--------------------------------------------------|---------|
| Norflurane | R134a | 811-97-2 | 212-377-0 | C2H2F4 | Press. Gas (Liq. gas); H280 | 52±2 |
| Pentafluoroethane | R125 | 354-33-6 | 206-557-8 | C2HF5 | Press. Gas (Comp. gas); H280 | 25±2 |
| Difluoromethane | R32 | 75-10-5 | 200-839-4 | CH2F2 | Flam. Gas 1; H220 Press. Gas (Liq. gas); H280 | 23±2 |

Remark: The rest unspecified ingredients are impurities, and they are not hazard.

Full text of R-phrase(s) and H-statement(s): see section 16.

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Section 4: First aid measures

4.1 Description of first aid measures

General notes: In all cases of doubt, or when symptoms persist, seek medical attention.

Following inhalation:

Remove patient from exposure, keep warm and at rest.

Administer oxygen if necessary.

Apply artificial respiration if breathing has ceased or shows signs of failing.

In the event of cardiac arrest apply external cardiac massage.

Obtain immediate medical attention.

Following skin contact:

Thaw affected areas with water. Remove contaminated clothing.

Caution: clothing may adhere to the skin in the case of freeze burns.

After contact with skin, wash immediately with plenty of warm water.

If irritation or blistering occur obtain medical attention.

Following eye contact:

Immediately irrigate with eyewash solution or clean water, holding the eyelids apart, for at least 10 minutes. Obtain immediate medical attention.

Following ingestion:

Ingestion is not considered a potential route of exposure.

Do not induce vomiting. Provided the patient is conscious, wash out mouth with water and give 200-300 ml (half a pint) of water to drink. Obtain immediate medical attention.

Notes for the doctor:

Adrenaline and similar sympathomimetic drugs should be avoided following exposure as cardiac arrhythmia may result with possible subsequent cardiac arrest. Treat symptomatically and supportively. Treatment may vary with condition of victim and specifics of incident.

4.2 Most important symptoms and effects, both acute and delayed

Low acute toxicity. High exposures may cause an abnormal heart rhythm and prove suddenly fatal.

Very high atmospheric concentrations may cause anaesthetic effects and asphyxiation.

Liquid splashes or spray may cause freeze burns to skin and eyes.

4.3 Indication of the immediate medical attention and special treatment needed

Persons with pre-existing skin, eye, or respiratory disease may be at increased risk from the irritant or allergic properties of this material. Attending physician should treat exposed patients symptomatically.

Section 5: Fire-fighting measures

5.1 Extinguishing media

Suitable extinguishing media:

In case of fire in the surroundings: use appropriate extinguishing media.

Unsuitable extinguishing media:

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For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture

This refrigerant is not flammable in air under ambient conditions of temperature and pressure.

Certain mixtures of this refrigerant and air when under pressure may be flammable.

Mixtures of this refrigerant and air under pressure should be avoided.

Certain mixtures of HFCs and chlorine may be flammable or reactive under certain conditions.

Thermal decomposition will evolve very toxic and corrosive vapours. (hydrogen fluoride)

Containers may burst if overheated.

5.3 Advice for fire-fighters

Shut off gas supply if this can be done safely. If possible, take container out of dangerous zone.

Cool cylinders with water spray. Self-contained breathing apparatus (SCBA) may be required if cylinders rupture or release under fire conditions.

Section 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Immediately contact emergency personnel. Keep unnecessary personnel away.

Use suitable protective equipment (section 8). Shut off gas supply if this can be done safely.

Isolate area until gas has dispersed.

6.2 Environmental precautions

Prevent liquid from entering drains, sewers, basements and work pits since the vapour may create a suffocating atmosphere.

6.3 Methods and material for containment and cleaning up

Provided it is safe to do so, isolate the source of the leak.

Allow small spillages to evaporate provided there is adequate ventilation.

Large spillages: Ventilate area. Contain spillages with sand, earth or any suitable adsorbent material.

6.4 Reference to other sections

See Section 7 for information on safe handling.

See section 8 for information on personal protection equipment.

See Section 13 for information on disposal.

Section 7: Handling and storage

7.1 Precautions for safe handling

Avoid inhalation of high concentrations of vapours. Atmospheric levels should be controlled in compliance with the occupational exposure limit. Atmospheric concentrations well below the occupational exposure limit can be achieved by good occupational hygiene practice.

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The vapour is heavier than air, high concentrations may be produced at low levels where general ventilation is poor, in such cases provide adequate ventilation or wear suitable respiratory protective equipment with positive air supply. Avoid contact with naked flames and hot surfaces as corrosive and very toxic decomposition products can be formed. Avoid contact between the liquid and skin and eyes. For correct refrigerant composition, systems should be charged using the liquid phase and not the vapour phase.

Process Hazards:

Liquid refrigerant transfers between refrigerant containers and to and from systems can result in static generation. Ensure adequate earthing. Certain mixtures of HFCs and chlorine may be flammable or reactive under certain conditions.

7.2 Conditions for safe storage, including any incompatibilities

Keep in a well ventilated place. Keep in a cool place away from fire risk, direct sunlight and all sources of heat such as electric and steam radiators.

Avoid storing near to the intake of air conditioning units, boiler units and open drains.

Cylinders and Drums: Keep container dry. Storage temperature: < 45°C

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated.

Section 8 : Exposure controls/personal protection

8.1 Control parameters

Occupational exposure limit values:

| R134a CAS # 811-97-2 Country of origin | Occupational exposure limit values | | | |
|-------------------------------------------|------------------------------------|------------------------|------------|-------------------------|
| | Long term/ Eight hours | | Short term | |
| Austria | 1000 ppm | 4200 mg/m ³ | 4000 ppm | 16800 mg/m ³ |
| Germany (AGS) | 1000 ppm | 4200 mg/m ³ | 8000 ppm | 33600 mg/m ³ |
| Germany (DFG) | 1000 ppm | 4200 mg/m ³ | 8000 ppm | 33600 mg/m ³ |
| Sweden | 500 ppm | 2000 mg/m ³ | 750 ppm | 3000 mg/m ³ |
| Switzerland | 1000 ppm | 4200 mg/m ³ | - | - |
| United Kingdom | 1000 ppm | 4240 mg/m ³ | - | - |

| R125 CAS # 354-33-6 Country of origin | Occupational exposure limit values | | | |
|------------------------------------------|------------------------------------|------------------------|------------|------------------------|
| | Long term/ Eight hours | | Short term | |
| Sweden | 500 ppm | 2500 mg/m ³ | 750 ppm | 3750 mg/m ³ |

R32 CAS # 75-10-5 Long Term Exposure Limit (LTEL) : 8-hr Time-weighted Average (TWA) 1000 ppm.

8.2 Exposure controls

Appropriate engineering controls:

Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

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Personal protective equipment:

Eye and face protection: Sufficient eye protection should be worn. When handling compressed gas, at least glasses with side protection should be worn. When handling liquid gas, chemical safety goggles must be used as well as a protective shield.

Skin protection:

Body protection:

Use protective boots while handling gas cylinders.

Hand protection:

Wear leather gloves to prevent frostbite injuries from rapidly expanding gas when handling pressurised gas bottles.

Respiratory protection:

In an emergency (e.g.: unintentional release of the substance, exceeding the occupational exposure limit value) respiratory protection must be worn. Consider the maximum period for wear. Wear self-contained breathing apparatus. Do not use filter respirator.

Environmental exposure controls:

Do not allow material to be released to the environment without the proper governmental permits.

Industrial hygiene:

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday. Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Section 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

| | |
|-------------------------------------------|------------------------------------------------------------------------------|
| Appearance: | Compressed liquefied gas. |
| Colour: | Clear, colorless |
| Odour: | Slight ethereal |
| pH: | Not available. |
| Melting point: | No data available. |
| Boiling point: | -44.3 °C to -37.1 °C |
| Density: | 1.16 g/cm ³ at 20 °C |
| Vapour Density: | 3.0 at bubble point temperature. (Air = 1) |
| Vapour pressure: | 7810 mm Hg at 20 °C |
| Partition coefficient (n -octanol/water): | Log pow = 1.274 (R134a, HSDB); Log pow = 2.3 (R125); Log pow = 0.2 (R32). |
| Solubility in water: | Insoluble in water; Soluble in: chlorinated solvents, alcohols, esters. |
| Flash point: | No data available. |
| Critical Temperature: | 87.3 °C |
| Critical Pressure: | 4.63 Mpa |
| Flammability: | Not flammable. |
| Decomposition temperature: | No data available. |
| Explosive properties: | No data available. |
| Oxidising properties: | Non oxidizer. |

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Evaporation rate : No data available.
Viscosity: No data available.

9.2 Other information

No data available.

Section 10: Stability and reactivity

10.1 Reactivity

Certain mixtures of HFCs and chlorine may be flammable or reactive under certain conditions.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of hazardous reactions

Can react violently if in contact with alkali metals and alkaline earth metals - sodium, potassium, barium.

10.4 Conditions to avoid

Avoid open flames and high temperatures.

10.5 Incompatible materials

Incompatible materials: finely divided metals, magnesium and alloys containing more than 2% magnesium.

10.6 Hazardous decomposition products

Hazardous Decomposition Product(s): hydrogen fluoride by thermal decomposition and hydrolysis.

Section 11: Toxicological information

11.1 Toxicokinetics, metabolism and distribution

R134a The metabolism of R-134a by hepatocytes was investigated. Liver cells were isolated from male Fischer 344 rats and exposed to atmospheres containing R-134a and/or halothane and analyzed for fluoride. It was concluded that R-134a can be metabolized by liver cells, and may involve cytochrome p450. (HSDB)

R125 There is a significant accumulation of fluorocarbons in brain, liver & lung compared to blood levels, signifying a tissue distribution of fluorocarbons similar to that of chloroform. (HSDB)

R32 No data available.

11.2 Information on toxicological effects

Acute toxicity:

R134a Acute Inhalation toxicity: LC₅₀ = 1700 g/m³/2h (mouse) (NLM Dataset);
LC₅₀ = 1500 g/m³/4h (rat) (NLM Dataset);

R125 Acute Inhalation toxicity: LC₅₀ = 2735 g/m³/2h (mouse) (NLM Dataset);

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R32 Acute Inhalation toxicity: LC₅₀ = 2910 g/m³/4h (rat) (NLM Dataset);
LC₅₀ = 1890 g/m³/4h (rat) (NLM Dataset);
LC₅₀ = 1810 g/m³ (mouse) (NLM Dataset);

Skin corrosion/irritation:

R134a Slight skin irritant.

R125 No data available.

R32 No data available.

Mixture Liquid splashes or spray may cause freeze burns. Unlikely to be hazardous by skin absorption.

Serious eye damage/irritation:

R134a Slight eye irritation resulted from a brief spray of vapor.

R125 No data available.

R32 No data available.

Mixture Liquid splashes or spray may cause freeze burns.

Respiratory or skin sensitization:

To the best of our knowledge, the toxicological properties have not been thoroughly investigated.

CMR effects (Carcinogenicity, Mutagenicity and Toxicity for Reproduction):

No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

The substance or mixture is not classified as mutagens or toxic to reproduction.

STOT-single exposure and repeated exposure:

R134a **Effects of short-term exposure:**

Rapid evaporation of the liquid may cause frostbite. The substance may cause effects on the central nervous system and cardiovascular system, resulting in cardiac disorders.

Additional information:

No data available.

Section 12: Ecological information

12.1 Toxicity

R134a Acute toxicity to fish: LC₅₀ = 450 mg/l/96h (*Rainbow Trout*);

Acute toxicity to daphnia: EC₅₀ = 980 mg/l/48h (*Daphnia magna*);

R125 Quantitative data on the acute fish/daphnia/bacteria toxicity of this product are not available.

R32 Quantitative data on the acute fish/daphnia/bacteria toxicity of this product are not available.

12.2 Persistence and degradability

R134a Decomposes comparatively rapidly in the lower atmosphere (troposphere).
Atmospheric lifetime is 15.6 years.

R125 Highly chlorinated/fluorinated compounds are not expected to biodegrade rapidly. (HSDB)
Decomposed slowly in the lower atmosphere (troposphere).
Atmospheric lifetime is 32.6 year(s).

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- R32 Decomposed comparatively rapidly in the lower atmosphere (troposphere). Atmospheric lifetime is 5.6 year(s). Products of decomposition will be highly dispersed and hence will have a very low concentration. Does not influence photochemical smog (i.e. is not a VOC under the terms of the UNECE agreement).

12.3 Bioaccumulative potential

- R134a Estimated bioconcentration factors ranging from 5 to 58 can be calculated for R-134a based on its estimated log octanol/water partition coefficient, 1.274, and estimated water solubility, 67 mg/L at 25° C, in turn estimated from its estimated Henry's Law constant and estimated vapor pressure, using appropriate regression equations. These values indicate that R-134a will not bioconcentrate in fish and aquatic organisms.
- R125 An estimated BCF of 3.1 was calculated for pentafluoroethane, using an estimated log Kow of 1.6 and a regression-derived equation. No appreciable bioaccumulation potential is to be expected. (HSDB)
- R32 Log pow = 0.2. The low octanol-water partition coefficient indicated that the product is not likely to bioaccumulate.

12.4 Mobility in soil

- R134a Estimated soil adsorption coefficients ranging from 117 to 432 can be calculated for R-134a based on its estimated log octanol/water partition coefficient, 1.274, and estimated water solubility, 67 mg/L at 25°C, in turn estimated from its estimated Henry's Law constant and estimated vapor pressure, using appropriate regression equations. These values indicate that R-134a will display moderate to high mobility in soil. (HSDB)
- R125 The Koc of pentafluoroethane is estimated as approximately 170, using an estimated log Kow of 1.6 and a regression-derived equation. According to a classification scheme, this estimated Koc value suggests that pentafluoroethane is expected to have moderate mobility in soil. (HSDB)
- R32 To the best of our knowledge, the toxicological properties have not been thoroughly investigated.

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment information is not available as chemical safety assessment not conducted.

12.6 Other adverse effects

- R134a Global warming potential (GWP) = 1300.
R125 Global warming potential (GWP) = 3400.
R32 Global warming potential (GWP) = 550.
Climatic warming potential.

Section 13: Disposal considerations

13.1 Waste treatment methods

Best to recover and recycle. If this is not possible, destruction is to be in an approved facility which is equipped to absorb and neutralise acid gases and other toxic processing products.

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Mark empty vessels to avoid confusion with full ones.

Disposal must comply with federal, state, and local disposal or discharge laws.

Section 14: Transport information

14.1 Land transport (ADR/RID/GGVSE)

UN-No.: 3340
Official transport designation: REFRIGERANT GAS R 407C
Class: 2.2
Classification Code: 2A
Packing group: -
Hazard label: 2.2

14.2 Sea transport (IMDG-Code/GGVSee)

Proper Shipping Name: REFRIGERANT GAS R 407C
Class: 2.2
UN-No.: 3340
Packing group: -

14.3 Air transport (ICAO-TII/IATA-DGR)

Proper Shipping Name: REFRIGERANT GAS R 407C
Class: 2.2
UN-No.: 3340
Packing group: -

14.4 Additional information

No data available.

Section 15: Regulatory information

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

EU regulation:

Authorisations: No information available.

Restrictions on use: No information available.

EINECS: All the ingredients of the product are listed in the Inventory.

DSD (67/548/EEC): All the ingredients of the product are not listed in the Annex I.

Regulation (EC) No 842/2006: All the ingredients of the product are listed in the Annex I of Regulation (EC) No 842/2006 on certain fluorinated greenhouse gases.

Other chemical regulation:

USA - TSCA: All the ingredients of the product are listed in the Inventory.

Canada - DSL: All the ingredients of the product are listed in the Inventory.

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| | |
|--------------------------|-----------------------------------------------------------------|
| Australia - AICS: | All the ingredients of the product are listed in the Inventory. |
| Korea - ECL: | All the ingredients of the product are listed in the Inventory. |
| Japan - ENCS: | All the ingredients of the product are listed in the Inventory. |
| China - IECSC: | All the ingredients of the product are listed in the Inventory. |

15.2 Chemical Safety Assessment

No Chemical Safety Assessment has been carried out for this substance.

Section 16: Other information

16.1 Revision Information:

Date of the previous revision: Not applicable. Date of this revision: 28/12/2010.
Revision summary: The first new SDS

16.2 Abbreviations and acronyms

| | |
|----------------|-----------------------------------------------------------------------------------------------------------------|
| CLP: | EU regulation (EC) No 1272/2008 on classification, labelling and packaging of chemical substances and mixtures. |
| CAS: | Chemical Abstracts Service (division of the American Chemical Society). |
| EINECS: | European Inventory of Existing Commercial Chemical Substances. |
| IARC: | International agency for research on cancer. |
| RID: | European Rail Transport. |
| IMDG: | International Maritime Code for Dangerous Goods. |
| IATA: | International Air Transport Association. |
| DPD: | Dangerous Preparations Directive (1999/45/EEC). |
| DSD: | Dangerous Substance Directive (67/548/EEC). |
| TSCA: | Toxic Substances Control Act, The American chemical inventory. |
| DSL: | Domestic Substances List, The Canadian chemical inventory. |
| AICS: | The Australian Inventory of Chemical Substances. |
| ECL: | Existing Chemicals List, the Korean chemical inventory. |
| ENCS: | Japanese Existing and New Chemical Substances. |
| IECSC: | Inventory of existing chemical substances in China. |

16.3 Key literature references and sources for data

ESIS IUCLID Dataset: European chemical Substances Information System.
HSDB: Hazardous Substances Data Bank.
ICSC: International Chemical Safety Cards.
NLM Dataset: United States National library of medicine.
GESTIS Substance database.

16.4 Relevant R-phrases and H-statements

R-phrases (code and full text):
R12: Extremely flammable.
H-statements (code and full text):

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

H220: Extremely flammable gas.

16.5 Training advice

Provide adequate information, instruction and training for operators.

16.6 Declare to reader

The information in this Safety Data Sheet (SDS) was obtained from sources which we believe are reliable. However, the information is provided without any warranty, express or implied, regarding its correctness. The conditions or methods of handling, storage, use or disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of the product. This SDS was prepared and is to be used only for this product. If the product is used as a component in another product, this SDS information may not be applicable. According to REACH Article 31(5), the SDS shall be supplied in an official language of the Member State(s) where the substance or mixture is placed on the market, unless the recipient Member State(s) concerned provide otherwise. It should also be noted that this SDS is applicable to the countries with English as an official language.

----- End of the SDS -----