



SAFETY DATA SHEET

In compliance with EC Regulations No.: 1907/2006, 830/2015 and 1272/2008 (CLP).

Date last modified: 30 October 2020 - Version 5.0

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY

1.1 Product Identifier

Product Name: REFRIGERANT R417A

Product Code #: 330236

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

Relevant identified uses: Refrigerant.

Industrial and professional uses only. Perform risk assessment prior to use.

Uses advised against: This product is not recommended for any industrial, professional or consumer use other than the Intended Uses above and the instructions written in this Safety Data Sheet.

1.3 Details of the supplier of the safety data sheet

Company/undertaking identification

Supplier/Manufacturer:

Marichem Marigases Hellas SA

Sfaktirias 64,

185 45 Piraeus,

Greece

Tel. No.: ++30 210 4148800

Fax No.: ++30 210 4133985

<http://www.marichem-marigases.com>

e-mail: mail@marichem-marigases.com

1.4 Emergency telephone number

Tel. No.: ++30 210 4148800 (including working hours)

Emergency Information:

Inside U.S. and Canada: (800)-424-9300 (CHEMTREC)

Outside U.S. and Canada: 1-703-527-3887 (CHEMTREC)

National Emergency Centre (Greece): ++30 210 7793777

2. HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

Hazard Class and Category Code Regulation EC 1272/2008 (CLP/GHS)

Physical hazards

Gases under pressure, Liquefied gas.

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

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

2.2. Label elements

Labelling Regulation EC 1272/2008 (CLP)

Hazard pictograms:



GHS04

Signal word: Warning

Hazard Statements

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

Special labelling of certain substances and mixtures

Kyoto: Contains fluorinated greenhouse gas covered by the Kyoto Protocol., HFC-134a, HFC-125.

Precautionary statements

Storage

P410 + P403 Protect from sunlight. Store in a well-ventilated place.

2.3. Other hazards

This mixture contains no substance considered to be persistent, bioaccumulating and toxic (PBT).

This mixture contains no substance considered to be very persistent and very bioaccumulating (vPvB).

Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.

Rapid evaporation of the liquid may cause frostbite.

Misuse or intentional inhalation abuse may cause death without warning symptoms, due to cardiac effects.

May cause cardiac arrhythmia.

Mixture/substance classification and labelling according to Directive 67/548/EEC, European [Dangerous Preparations Directive](#) (1999/45/EC), European Regulation 648/2004 and their amendments.

Not classified as hazardous to users. No special information required according to EC directives.

3. COMPOSITION / INFORMATION ON INGREDIENTS

3.1 Chemical Composition:

Ingredients	CAS Number	Concentration (%)	Hazard Code(s)*
n-Butane (HC-600) (< 0.1% Butadiene)	106-97-8	3.4 %	H220.
Pentafluoroethane (HFC 125)	354-33-6	46.6%	H280.
1,1,1,2-Tetrafluoroethane (HFC 134a)	811-97-2	50%	H280.

*See section 16 for the full text of the Hazard Code(s) declared above.

Occupational Exposure Limits, if available, are listed in section 8.

4. FIRST AID MEASURES

4.1. Description of first aid measures

General advice

If unconscious place in recovery position and seek medical advice.

Never give anything by mouth to an unconscious person.

If breathing is irregular or stopped, administer artificial respiration.

First aider needs to protect himself.

If symptoms persist, call a physician.

Inhalation

Move to fresh air. Keep patient warm and at rest.

Remove from exposure, lie down.

Artificial respiration and/or oxygen may be necessary. Call a physician.

Skin contact

Flush area with lukewarm water. Do not use hot water. If frostbite has occurred, call a physician.

Take off contaminated clothing and shoes immediately.

Eye contact

Hold eyelids apart and flush eyes with plenty of water for at least 15 minutes.

Get medical attention.

Ingestion

Is not considered a potential route of exposure.

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

Symptoms

Misuse or intentional inhalation abuse may cause death without warning symptoms, due to cardiac effects.

Other symptoms potentially related to misuse or inhalation abuse are: Anaesthetic effects, Light-headedness, dizziness, confusion, incoordination, drowsiness, or unconsciousness, irregular heartbeat with a strange sensation in the chest, heart thumping, apprehension, feeling of fainting, dizziness or weakness.

Skin contact may provoke the following symptoms:

Frostbite, Irritation, Discomfort, Itching, Redness, Swelling of tissue

Eye contact may provoke the following symptoms:

Frostbite, Irritation, Tearing, redness, or discomfort.

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

Treatment: Do not give adrenaline or similar drugs.

5. FIRE FIGHTING MEASURES

5.1. Extinguishing media

Suitable extinguishing media: Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Use water spray, alcohol-resistant foam, dry chemical or Carbon Dioxide.

5.2. Special hazards arising from the substance or mixture

Specific hazards during fire-fighting:

Exposure to fire may cause containers to rupture/explode. Non flammable.

Pressure build-up.

Fire or intense heat may cause violent rupture of packages.

Hazardous thermal decomposition products:

Fluorinated compounds

Hydrogen fluoride

Carbon oxides

Exposure to decomposition products may be a hazard to health.

5.3. Advice for fire-fighters

Special protective equipment for fire-fighters

In the event of fire, wear self-contained breathing apparatus. Use personal protective equipment.

Wear neoprene gloves during cleaning up work after a fire.

Further information: Cool containers/tanks with water spray

6. ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Personal precautions:

Evacuate personnel to safe areas. Ventilate area, especially low or enclosed places where heavy vapours might collect. Refer to protective measures listed in sections 7 and 8.

6.2. Environmental precautions

Environmental precautions: Should not be released into the environment.

It must be used in accordance with local and national regulations.

Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous. Try to stop release.

6.3. Methods and materials for containment and cleaning up

Methods for cleaning up: Evaporates.

6.4. Reference to other sections

For disposal instructions see section 13.

7. HANDLING AND STORAGE

7.1. Precautions for safe handling

Advice on safe handling

Avoid breathing vapours or mist. Avoid contact with skin, eyes and clothing. Provide sufficient air exchange and/or exhaust in work rooms. For personal protection see section 8.

Vapours are heavier than air and may spread along floors.

Advice on protection against fire and explosion

The product is not flammable in air under ambient conditions of temperature and pressure. When pressurised with air or oxygen, the mixture may become flammable. Certain mixtures of HCFCs or HFCs with chlorine may become flammable or reactive under certain conditions.

7.2. Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers

Do not drag, slide or roll cylinders. Never attempt to lift cylinder by its cap. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder. Keep at temperature not exceeding 52°C. Keep containers tightly closed in a dry, cool and well-ventilated place. Protect from contamination. Protect cylinders from damage. Keep away from direct sunlight. Store only in approved containers.

Advice on common storage

No materials to be especially mentioned. For further information see Section 10 of the safety data sheet.

Storage period: > 10 years.

Storage temperature: < 52 °C.

7.3. Specific end use(s)

No data available.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1. Control parameters

If sub-section is empty then no values are applicable.

Components with workplace control parameters

1,1,1,2-Tetrafluoroethane (CAS-No. 811-97-2)				
Type/Form of exposure	Control parameters	Update	Regulatory basis	Remarks
Time Weighted Average (TWA):	4,240 mg/m ³ 1,000 ppm	2007	UK. EH40 Workplace Exposure Limits (WELs)	

Butane (<0.1% butadiene) (CAS-No. 106-97-8)				
Type/Form of	Control	Update	Regulatory basis	Remarks

exposure	parameters			
Time Weighted Average (TWA):	1,450 mg/m ³ 600 ppm	2007	UK. EH40 Workplace Exposure Limits (WELs)	
Short term exposure limit	1,810 mg/m ³ 750 ppm	2007	UK. EH40 Workplace Exposure Limits (WELs)	

Derived No Effect Level (DNEL)

Pentafluoroethane

Type of Application (Use): Workers

Exposure routes: Inhalation

Health Effect: Chronic effects, Systemic toxicity

Value: 16444 mg/m³

Type of Application (Use): Consumers

Exposure routes: Inhalation

Health Effect: Chronic effects, Systemic toxicity

Value: 1753 mg/m³

1,1,1,2-Tetrafluoroethane

Type of Application (Use): Workers

Exposure routes: Inhalation

Health Effect: Chronic effects, Systemic toxicity

Value: 13936 mg/m³

Type of Application (Use): Consumers

Exposure routes: Inhalation

Health Effect: Chronic effects, Systemic toxicity

Value: 2476 mg/m³

Predicted No Effect Concentration (PNEC)

Pentafluoroethane

Value: 0.1 mg/l

Compartment: Fresh water

Value: 1 mg/l

Compartment: Water

Remarks: Intermittent use/release.

Value: 0.6 mg/kg

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

Compartment: Water

Remarks: Intermittent use/release.

Value: 0.75 mg/kg dry weight (d.w.)
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.

Eye protection

Wear safety glasses or coverall chemical splash goggles. Eye protection complying with EN 166. or ANSI Z87.1 Additionally wear a face shield where the possibility exists for face contact due to splashing, spraying or airborne contact with this material.

Hand protection

Material: Leather gloves

The suitability for a specific workplace should be discussed with the producers of the protective gloves.

Material: Low temperature resistant gloves

Protective gloves complying with EN 374. or US OSHA guidelines

The choice of an appropriate glove does not only depend on its material but also on other quality features and is different from one producer to the other. Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. Also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion, and the contact time.

Skin and body protection

Wear suitable protective equipment.

Wear as appropriate: impervious clothing

Protective measures

Self-contained breathing apparatus (SCBA) is required if a large release occurs.

The type of protective equipment must be selected according to the concentration and amount of the substance at the specific workplace.

Hygiene measures

Handle in accordance with good industrial hygiene and safety practice.

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.

Respiratory protection complying with EN 137.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Form:	Gas at ambient temperature
Color:	Colorless
Odor:	Slightly ethereal odor
Boiling Point:	Dew at 1 Atm: -34.11 ⁰ C Bubble at 1 Atm: -39.11 ⁰ C
Vapor Pressure:	at 21.11 ⁰ C: 116.4 psia at 54.44 ⁰ C: 280.8 psia
Solubility in Water:	Not determined
pH:	Not Applicable
Molecular Weight:	106.6 gr/mol
% Volatiles:	100%

9.2. Other information

No data available.

10. STABILITY AND REACTIVITY

10.1. Reactivity

Decomposes on heating.

10.2. Chemical stability

he product is chemically stable.

10.3. Possibility of hazardous reactions

Polymerisation will not occur. Stable under recommended storage conditions.

10.4. Conditions to avoid

Avoid open flames and high temperatures. The product is not flammable in air under ambient conditions of temperature and pressure. When pressurised with air or oxygen, the mixture may become flammable. Certain mixtures of HCFC's or HFC's with chlorine may become flammable or reactive under certain conditions. Pressurized container: Do not pierce or burn, even after use. Keep at temperature not exceeding 52°C.

10.5. Incompatible materials

Alkali metals
Alkaline earth metals
Powdered metals
Powdered metal salts

10.6. Hazardous decomposition products

Hazardous thermal decomposition products may include:

Hydrogen fluoride
Carbon oxides

11. TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Acute oral toxicity

Butane (<0.1% butadiene)

Not applicable.

Acute inhalation toxicity

Pentafluoroethane

LC50 / 4 h Rat :> 800000 ppm
Method: OECD Test Guideline 403

No Observed Adverse Effect Concentration / Dog :75000 ppm
Cardiac sensitization.

Low Observed Adverse Effect Concentration (LOAEC) / Dog :100000 ppm
Cardiac sensitization.

1,1,1,2-Tetrafluoroethane

LC50 / 4 h Rat :> 567000 ppm

No Observed Adverse Effect Concentration / Dog :40000 ppm
Cardiac sensitization.

Low Observed Adverse Effect Concentration (LOAEC) / Dog :80000 ppm
Cardiac sensitization.

Butane (<0.1% butadiene)

LC50 / 4 h Rat :277018 ppm
Irritating to respiratory system. Central nervous system depression narcosis.

Acute dermal toxicity

Butane (<0.1% butadiene)

Not applicable.

Skin irritation

1,1,1,2-Tetrafluoroethane

Rabbit
Classification: Not classified as irritant
Result: No skin irritation

Butane (<0.1% butadiene)

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: No eye irritation.

Butane (<0.1% butadiene)

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

Pentafluoroethane

Human

Classification: Does not cause respiratory sensitisation.

Result: Does not cause respiratory sensitisation.

1,1,1,2-Tetrafluoroethane

Guinea pig

Classification: Does not cause skin sensitisation.

Result: Does not cause skin sensitisation.

Rat

Classification: Does not cause respiratory sensitisation.

Result: Does not cause respiratory sensitisation.

Butane (<0.1% butadiene)

Not tested on animals.

Classification: Not a skin sensitizer.

There are no reports of human skin sensitization. Not expected to cause sensitization based on expert review of the properties of the substance.

Repeated dose toxicity

Pentafluoroethane

Inhalation Rat

No toxicologically significant effects were found.

1,1,1,2-Tetrafluoroethane

Inhalation Rat

No toxicologically significant effects were found.

Butane (<0.1% butadiene)

Inhalation multiple species.

No toxicologically significant effects were found.

Mutagenicity assessment**Pentafluoroethane**

Animal testing did not show any mutagenic effects. Evidence suggests this substance does not cause genetic damage in cultured mammalian cells. Did not cause genetic damage in cultured bacterial cells.

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.

Butane (<0.1% butadiene)

Animal testing did not show any mutagenic effects.

Carcinogenicity assessment**Pentafluoroethane**

Not classifiable as a human carcinogen. Overall weight of evidence indicates that the substance is not carcinogenic.

1,1,1,2-Tetrafluoroethane

Not classifiable as a human carcinogen. Overall weight of evidence indicates that the substance is not carcinogenic.

Toxicity to reproduction assessment**Pentafluoroethane**

No toxic to reproduction. Animal testing showed no reproductive toxicity.

1,1,1,2-Tetrafluoroethane

No toxic to reproduction. No effects on or via lactation. Animal testing showed no reproductive toxicity.

Assessment teratogenicity**Pentafluoroethane**

Animal testing showed no developmental toxicity.

1,1,1,2-Tetrafluoroethane

Animal testing showed no developmental toxicity.

Further information

Avoid skin contact with leaking liquid (danger of frostbite).

12. ECOLOGICAL INFORMATION

12.1. Toxicity

Toxicity to fish

Pentafluoroethane

LC50 / 96 h / *Oncorhynchus mykiss* (rainbow trout): 450 mg/l

Information given is based on data obtained from similar substances.

1,1,1,2-Tetrafluoroethane

LC50 / 96 h / *Oncorhynchus mykiss* (rainbow trout): 450 mg/l

Butane (<0.1% butadiene)

LC50 / 96 h / Fish (unspecified species): > 1,000 mg/l

Toxicity to aquatic plants

Pentafluoroethane

ErC50 / 96 h / Algae: 142 mg/l

Information given is based on data obtained from similar substances.

NOEC / 72 h / *Pseudokirchneriella subcapitata* (green algae): 13.2 mg/l

Information given is based on data obtained from similar substances.

1,1,1,2-Tetrafluoroethane

ErC50 / 96 h / Algae: 142 mg/l

Information given is based on data obtained from similar substances.

NOEC / 72 h / *Pseudokirchneriella subcapitata* (green algae): 13.2 mg/l

Information given is based on data obtained from similar substances.

Toxicity to aquatic invertebrates

Pentafluoroethane

EC50 / 48 h / *Daphnia magna* (Water flea): 980 mg/l

Information given is based on data obtained from similar substances.

1,1,1,2-Tetrafluoroethane

EC50 / 48 h / *Daphnia magna* (Water flea): 980 mg/l

12.2. Persistence and degradability

Biodegradability

Pentafluoroethane

Not rapidly biodegradable.

1,1,1,2-Tetrafluoroethane

Not biodegradable.

Butane (<0.1% butadiene)

at 34 d

Biodegradation: 100 %

Readily biodegradable.

12.3. Bioaccumulative potential

Bioaccumulation

No data available.

12.4. Mobility in soil

No data available.

12.5. Results of PBT and vPvB assessment

PBT and vPvB assessment

This mixture contains no substance considered to be persistent, bioaccumulating and toxic (PBT). / This mixture contains no substance considered to be very persistent and very bioaccumulating (vPvB).

12.6. Other adverse effects

Ozone depletion potential: 0

Global warming potential (GWP): 2346

Additional ecological information

IPCC - AR4 (Fourth Assessment Report of the Intergovernmental Panel on Climate Change) - 2007

13. DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Product: Can be used after re-conditioning. If re-conditioning is not practicable, dispose of in compliance with local regulations.

Contaminated packaging: Empty pressure vessels should be returned to the supplier. If recycling is not practicable, dispose of in compliance with local regulations.

14. TRANSPORT INFORMATION

14.1 Proper shipping name: REFRIGERANT GAS N.O.S. (1,1,1,2 - Tetrafluoroethane, Pentafluoroethane)

14.2 LAND TRANSPORT

UN number: 1078

ADR class: 2.2

RID-class: 2.2

Packing group (Packing Instruction): P200

Labeling: 2.2 - Non-flammable gas

Tunnel restriction code: (C/E)

14.3 SEA TRANSPORT

UN number: 1078

IMDG class: 2.2

IMDG packing group: Packing group (Packing Instruction): P200
Labeling: 2.2 - Non-flammable gas
EmS: F-C, S-V

14.4 AIR TRANSPORT

UN number: 1078
IATA/ICAO class: 2.2
Packing group: Packing group (Packing Instruction): P200
Labeling: 2.2 - Non-flammable gas

14.5 GENERAL

Gas cylinders must be equipped with valve protection caps during transportation.

14.6 GENERAL INFORMATION

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 that they are firmly secured. Ensure that the container valve is closed and not leaking. Ensure that the valve outlet cap nut or plug (where provided) is correctly fitted. Ensure that the valve protection device (where provided) is correctly fitted. Ensure adequate ventilation. Ensure compliance with applicable regulations.

15. REGULATORY INFORMATION

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

Other regulations: Take note of Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work.

EU. REACH, Annex XVII, Marketing and Use Restrictions (Regulation 1907/2006/EC)

Listed Substance: Butane (<0.1% butadiene) (CAS-No.106-97-8) (EC-No.203-448-7)
List number: 40

For information on uses please refer to Section 1.

For further information please refer to the list number in the regulation and relevant amendments.

15.2. Chemical Safety Assessment

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

16. OTHER INFORMATION

16.1 Full text of Hazard Code(s) referred in Section 3.

H220: Extremely flammable gas.

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

16.2 Abbreviations and acronyms

ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road).

RID: Règlement international concernant le transport des marchandises dangereuses par chemin de fer (Regulations Concerning the International Transport of Dangerous Goods by Rail).

IMDG: International Maritime Code for Dangerous Goods.

IATA: International Air Transport Association.

ICAO: International Civil Aviation Organization.

bw: Body weight.

Carc.: Carcinogenicity.
CAS number: Chemical Abstracts Service number.
CLP: Classification Labelling Packaging Regulation.
CSA: Chemical Safety Assessment.
CSR: Chemical Safety Report.
DNEL: Derived No Effect Level.
dw: Dry weight.
EC number: EINECS and ELINCS number.
EC: European Commission.
EC50: Half maximal effective concentration.
EINECS: European Inventory of Existing Commercial Chemical Substances.
ELINCS: European List of Notified Chemical Substances.
EmS: Emergency Schedule.
ERC: Environmental Release Category.
ES: Exposure scenario.
food: oral feed.
GHS: Globally Harmonized System of Classification and Labelling of Chemicals.
Irrit.: Irritation.
LC50: Lethal concentration, 50 %.
LD50: Median Lethal dose.
LOAEC: Lowest Observed Adverse Effect Concentration.
LOAEL: Lowest Observed Adverse Effect Level.
MK value: Maximum Concentration value.
NCO: An international corporation that provides customer service contracting.
NOAEC: No Observed Adverse Effect Concentration.
NOAEL: No Observed Adverse Effect Level.
NOEC: No Observed Effect Concentration.
OECD: Organisation for Economic Cooperation and Development.
PBT: Persistent, Bioaccumulative and Toxic.
PNEC: Predicted No Effect Concentration.
PROC: Process category.
REACH: The Registration, Evaluation, Authorisation and Restriction of Chemicals.
Resp.: Respiratory.
Sens.: Sensitization.
STEL value: Short Term Exposure Limit value.
STOT RE: Specific target organ toxicity — repeated exposure.
STOT SE: Specific target organ toxicity — single exposure.
STOT: Specific Target Organ Toxicity.
STP: Sewage Treatment Plant.
SU: Sector of use.
Tox.: Toxicity.
TWA value: Time Weighted Average value.
vPvB: Very Persistent and Very Bioaccumulative.

16.3 Notice to reader

All information, instructions and statements contained in this Material Safety Data Sheet are compiled in accordance with European Directives, corresponding national legislation and on the basis of information given by our suppliers.

The information disclosed in this Material Safety Data Sheet (which supersedes all previous versions) is believed to be correct, at the date of issue, to the best of our current knowledge and experience. It only relates to the specific product designated herein and it may not be valid when said product is used in combination with any other products or in any processed form, unless specified in the text. This document aims to provide the necessary health and safety information of the product and is not to be considered a warranty or quality specification. It is the responsibility of the recipient of this Material Safety Data Sheet to ensure that information given here is read and understood by all who use, handle, dispose of or in any way come in contact with the product.

Also, it is the responsibility of the user to comply with local legislation relating to safety, health, environment and waste management. Data and information provided concerning the product are informative, exclusively presented to the customer.