



SAFETY DATA SHEET

R-444A

Issue: June 2025 Version 2.1

Date: 18.06.2025

SECTION 1. Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Trade name: **R-444A**
UFI : **SS00-F0GJ-N002-SN42**

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

Use of the substance/mixture: Refrigerant
Restrictions on use: For professional use only.

1.3. Details of the supplier of the safety data sheet

Company: GAS SERVEI S.A.
Address: C/ Motors, 151-155 nave nº 9
08038 Barcelona
ESPAÑA
Telephone: +34 (93) 2231377
Fax: +34 (93) 2231479
www.gas-servei.com
Email address of tperson responsible for the SDS: gas-servei@gas-servei.com

1.4. Emergency telephone number

National Institute of Toxicology and Forensic Sciences: + 34 (91) 5620420

SECTION 2. Hazards identification

2.1. Classification of the substance or mixture

Criteria EC Regulation 1272/2008 (Classification, Labeling, and Packaging):

Flammable gas, Category 1B H221: Flammable gas
Gases under pressure, Liquefied gas H280: Contains gas under pressure; may explode if heated.

2.2. Label elements

Danger pictograms: Symbols: GHS02 GHS04



A word of caution: Danger

Danger Signs: H221: Flammable gas.
H280: Contains gas under pressure; may explode if heated.

Precautionary statements: : Prevention:
P210: Keep away from heat, hot surfaces, sparks, open flames, and other sources of ignition. No smoking.

Response:

P377: Flaming gas leak: Do not extinguish unless the leak can be stopped safely.

P381: In case of leakage, remove all sources of ignition.

Storage:

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

Additional labeling:

Contains fluorinated greenhouse gases. (HFC-1234yf, HFC-32, HFC-152a)

2.3. Other hazards

This substance/mixture does not contain components that are considered to be persistent bioaccumulative and toxic (PBT) or very persistent bioaccumulative and very persistent (vPvB) at levels of 0.1% or higher.

Ecological information: The substance/mixture does not contain components that have endocrine-disrupting properties in accordance with Article 57(f) of REACH or Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

Toxicological information: The substance/mixture does not contain components that have endocrine-disrupting properties in accordance with Article 57(f) of REACH or Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

Vapors are heavier than air and may cause asphyxia by reducing oxygen in the air breathed.

Incorrect use or intentional inhalation abuse may cause death without warning symptoms due to cardiac effects.

Rapid evaporation of the product may cause frostbite.

May displace oxygen and cause rapid asphyxia.






SECTION 3. Composition/information on ingredients

3.1. Substances

Not applicable

3.2. Mixtures

Components

Chemical name	Concentration (%by weight)	CAS No.	CE No.	Registration No. REACH	Classification
					Regulations CE n°1272/2008
Trans-1,3,3,3-Tetrafluoroprop-1-ene (HFC1234ze)	83,0	29118-24-9	471-480-0	01-0000019758-54-XXXX	 2.5 Press. Gas H280
Difluoromethane (HFC32)	12,0	75-10-5	200-839-4	01-2119471312-47-XXXX	 2.2/1 Flam. Gas 1 H221  2.5 Press. Gas H280
1,1- Difluoroethane (HFC152a)	5,0	75-37-6	200-866-1	01-2119474440-43-XXXX	 2.2/1 Flam. Gas 1 H220  2.5 Press. Gas H280

SECTION 4. First aid measures

4.1. Description of first aid measures



General recommendations: In case of accident or discomfort, seek medical attention immediately.
If symptoms persist or in case of doubt, seek medical advice.

Protection of first aiders: No special precautions are required for first aiders.

In case of inhalation:	<p>If inhaled, move to fresh air.</p> <p>If not breathing, give artificial respiration.</p> <p>If breathing is difficult, give oxygen.</p> <p>Consult a doctor immediately.</p>
In case of skin contact:	<p>Thaw frozen parts with warm water. Do not rub the affected area.</p> <p>Consult a doctor immediately.</p>
In case of contact with eyes:	Consult a physician immediately.
If swallowed:	Ingestion is not considered a potential route of exposure.

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

May cause cardiac arrhythmia.

Other symptoms possibly related to misuse or abuse of inhalation are:

Cardiac sensitization	Anesthetic effects
Mild dizziness	Vértigo
Confusion	Lack of coordination
Drowsiness	Unconsciousness

The gas reduces the oxygen available for breathing.

Contact with the liquid or refrigerated gas may cause cold burns and frostbite.

4.3. Indication of any medical attention and special treatment needed

Treatment:	<p>Symptomatic treatment and supportive therapy as indicated.</p> <p>Due to possible cardiac arrhythmias, catecholamines, such as epinephrine, which may be used in emergency life-support situations, should be used with particular caution</p>
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SECTION 5. Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media:	<p>Water spray</p> <p>Alcohol-resistant foam</p> <p>Carbon dioxide (CO₂)</p> <p>Dry chemical</p>
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Unsuitable extinguishing media: Do not use water jet

5.2. Special hazards arising from the substance or mixture

Specific hazards during firefighting:	<p>Vapors may form a flammable mixture with air.</p> <p>Exposure to combustion products may be hazardous to health</p> <p>Do not inhale the gases produced.</p> <p>Due to high vapor pressure, there is a risk of containers bursting if the temperature rises.</p>
Hazardous Combustion Products:	<p>Hydrogen fluoride</p> <p>Carbonyl fluoride</p> <p>Carbon oxides</p> <p>Fluorinated compounds</p>

5.3. Advice for firefighters

Special protective equipment for firefighters:	<p>If necessary, use self-contained breathing apparatus for firefighting.</p> <p>Use personal protective equipment.</p>
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Specific extinguishing methods: Use extinguishing measures that are appropriate to local circumstances and surroundings.
Fight the fire from a distance due to the risk of explosion.
Use water spray to cool closed containers.
Remove intact containers from the fire area if it is safe to do so.
Evacuate the area.

SECTION 6. Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Evacuate personnel to safe areas.
Use self-contained breathing apparatus and appropriate personal protective equipment during spill cleanup
Avoid skin contact with dripping liquid (risk of frostbite).
Ventilate the area.
Follow the safe handling advice (see section 7) and personal protective equipment recommendations (see section 8).

6.2. Environmental precautions

Do not disperse into the environment.
Prevent the product from entering the soil/subsoil.
Prevent from entering surface water or sewage systems.
Prevent further leaks or spills safely.
Retain and remove contaminated water.
In the event of a gas leak or penetration into waterways, soil, or sewer systems, inform the responsible authorities.

6.3. Methods and material for containment and cleaning up

Methods for cleaning up: Ventilate the area.
Tools that do not produce sparks must be used.
Suppress gases/vapors/mists with water spray.
Wash with plenty of water.

Containment and cleaning materials: Suitable material for collection: absorbent, organic material, sand.

Local or national regulations may apply to the release and disposal of this material and to the materials and equipment used in cleaning up spills. You should determine which regulations apply.
Sections 13 and 15 of this safety data sheet provide information on certain local or national requirements.

6.4. Reference to other sections

See also sections 7, 8, 11, 12 y 13.

SECTION 7. Handling and storage

7.1. Precautions for safe handling

Technical measures: Use equipment rated for cylinder pressure.
Use a backflow prevention device on the pipe.
Close the valve after each use and after emptying.

Local/total ventilation: Use only with good ventilation. If there is insufficient ventilation, use in conjunction with local exhaust ventilation.
If the assessment establishes a potential local exposure, use only in an area equipped with explosion-proof exhaust ventilation.

Tips for safe handling: Avoid contact with skin and eyes.
Avoid inhaling vapors and fumes from the fluid.

Do not use empty containers that have not been previously cleaned.
Handle in accordance with good industrial safety and hygiene practices, based on the results of the workplace exposure assessment.
Keep the container tightly closed.
Wear insulated gloves and protective equipment for the face/eyes.
The protective valve caps and threaded plugs on the valve outlet must remain in place unless the container is secured with the valve outlet connected to the point of use.
Use a check valve or trap (exhaust, siphon trap, interceptor) in the discharge line to prevent dangerous reverse flow into the cylinder.
Before performing transfer operations, ensure that there are no incompatible materials and/or residues in the containers.
Prevent gas from flowing back into the gas container.
Use a pressure regulator when connecting the cylinder to lower pressure systems or pipes.
Close the valve after each use and after emptying.
DO NOT change or force the connections.
Prevent water from entering the gas container.
Never attempt to lift the cylinder by its cap.
Do not drag, slide, or roll cylinders.
Use a suitable hand truck to move the cylinder.
Keep away from heat and sources of ignition.
The transfer of liquid refrigerant from refrigerant containers to systems and from systems may cause the generation of static electricity.
Ensure that there is an adequate ground connection. Avoid the accumulation of electrostatic charges.
Pay attention to mitigating the risk of high pressures developing in systems, caused by temperature increases when liquid is trapped between closed valves or when containers have been overfilled.
Avoid spillage and waste. Minimize release to the environment.
DO NOT smoke.

Hygiene measures:

If exposure to chemicals is likely during normal use, provide eye wash stations and safety showers near the work area..
Do not eat, drink, or smoke during use.
Wash contaminated clothing before reuse.

7.2. Conditions for safe storage, including any incompatibilities

Technical requirements for warehouses and containers:

Keep cylinders in a well-ventilated place away from fire hazards..
Cylinders must be stored upright and secured to prevent them from falling or being knocked over. Avoid knocking the containers.
Separate full containers from empty containers.
Do not store near combustible materials.
Avoid areas where salt and other corrosive materials are present.
Store in properly labeled containers.
Keep containers tightly closed.
Keep in a cool, well-ventilated place.
Keep away from direct sunlight.
Store in accordance with specific national regulations.
Keep away from heat and sources of ignition.

Instructions for joint storage:

Do not store with the following types of products:
Self-reactive substances and mixtures
Organic peroxides
Oxidants
Flammable liquids

Flammable solids
Pyrophoric liquids
Pyrophoric solids
Substances and mixtures that undergo spontaneous heating.
Substances and mixtures which, in contact with water, emit flammable gases.
Explosives
Highly toxic mixtures and substances.
Highly toxic mixtures and substances.
Mixtures and substances with chronic toxicity

Recommended storage
temperature:

< 50 °C

Storage time:

> 10 años

More information about
stability during storage:

The product has an indefinite shelf life when stored properly.

7.3. Specific end uses

Subject to Member States' regulations, the uses to which it may be applied are as follows:
Refrigerant.

SECTION 8. Exposure controls/personal protection

8.1. Control parameters

Does not contain substances with occupational exposure limit values.

Level without derivative effect (DNEL) in accordance with Regulation (CE) No. 1907/2006:

Substance name	CAS No.	Final use	Exposure routes	Potential health effects	Value (mg/m ³)
Trans-1,3,3,3-Tetrafluoroprop-1-ene	29118-24-9	Workers	Inhalation	Long term - systemic effects	3.902
		Consumers	Inhalation		830
Difluoromethane	75-10-5	Workers	Inhalation	Long term - systemic effects	7.035
		Consumers	Inhalation		750
1,1- Difluoromethane	75-37-6	Workers	Inhalation	Long term - systemic effects	1.036
		Consumers	Inhalation		270

Planned gathering canceled (PNEC) in accordance with the Regulations (CE) No. 1907/2006:

Substance name	CAS No.	Environmental Compartment	Value
Trans-1,3,3,3-Tetrafluoroprop-1-ene	29118-24-9	Fresh water	0,1 mg/l
Difluoromethane	75-10-5	Fresh water	0,142 mg/l
		Release/discontinuous use	1,42 mg/l
		Freshwater sediment (dry weight)	0,534 mg/kg
1,1- Difluoromethane	75-37-6	Fresh water	48 – 168,28 µg/l
		Sea water	4,8 – 16,83 µg/l
		Release/discontinuous use	480 – 1.683 µg/l
		Freshwater sediment (dry weight)	190 – 1.141 µg/l
		Wastewater treatment plant	4.726 µg/l

8.2. . Exposure controls

Occupational exposure controls

Los equipos de protección personal deben cumplir las normas EN vigentes: Protección respiratoria EN 136, 140, 149; Gafas protectoras/Protección ocular EN 166; Vestimenta de protección EN 340, 463, 469, 943-1, 943-2; Guantes protectores CEN 374, 511; Zapatos protectores EN-ISO 20345.

Do not breathe vapors.

Engineering measures

Ensure adequate ventilation, especially in confined areas.

Minimize exposure concentrations in the workplace.

Personal protective equipment



Respiratory protection:

If there is no adequate exhaust ventilation or exposure assessment shows exposure outside recommended limits, use self-contained breathing apparatus or a positive-pressure air line with a mask.

The equipment must comply with UNE EN 14387.

Filter type:

Low boiling point organic gas and vapor (AX).

Skin and body protection:

Wash skin after all contact with the product.

Protective footwear should be worn when handling containers.



Hand protection:

Material:

Low temperature resistant gloves (EN 511).

Comments:

Choose chemical protective gloves based on the quantity and concentration of hazardous substances to be handled in the workplace. It is recommended to check with the manufacturer of the protective gloves mentioned above whether they have the necessary resistance for applications with special chemicals. Wash hands before breaks and after finishing work. The break-through time is not determined for the product.

Change gloves frequently.



Eye protection:

Wear the following personal protective equipment:

Chemical-resistant goggles must be worn..

Face shield.

The equipment must comply with UNE EN 166.

SECTION 9. Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance:	Liquefied gas
Color:	Colorless
Odor:	Light, similar to ether
Odor threshold:	No data available
pH:	No data available
Melting/freezing point:	No data available
Initial boiling point and boiling range:	-34.3°C to -24.2°C
Flash point:	Not applicable
Evaporation rate:	Not applicable
Flammability (solid, gas):	Flammable gas
Upper explosive limit	
/Upper flammability limit:	Upper flammability limit Method: ASTM E681 13.1% (v) at 23°C
Lower explosion limit	
/Lower flammability limit:	Lower flammability limit Method: ASTM E681 8.2% (v) at 23°C

Vapor pressure:	5,965 hPa (25 °C)
Vapor density:	3.7 kg/m ³ (at bubble point temperature)
Relative density:	1.163 (20 °C) (water=1)
Density:	1.16 g/cm ³ (20 °C) (as liquid)
Solubility (water solubility):	Insoluble
Partition coefficient	
(n-octanol/water):	Not applicable
Auto-ignition temperature:	No data available
Decomposition temperature:	Not applicable
Viscosity:	Not applicable
Explosive properties:	Not explosive
Oxidizing properties:	The substance or mixture is not classified as an oxidizer.
Particle size:	Not applicable

9.2. Other information

Combustion speed: <4 cm/s at 23°C (dry air, vertical tube apparatus)

Critical temperature: 94.7 °C

Critical pressure: 40.5 bar

SECTION 10. Stability and reactivity

10.1. Reactivity

Not classified as a reactivity hazard.

10.2. Chemical stability

Stable when used according to instructions. Follow the precautionary statements and avoid incompatible materials and conditions.

10.3. Possibility of hazardous reactions

Vapors may form a flammable mixture with air.

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

May react with strong oxidizing agents.

Flammable gas.

10.4. Conditions to avoid

Avoid heat, flames, and sparks.

10.5. Incompatible materials

Strong oxidizing agents (oxygen and peroxides), alkali metals and alkaline earth metals, and other metals and transition metals, aluminum powder, zinc, etc.

10.6. Hazardous decomposition products

Carbon oxides, carbonyl fluoride, hydrogen fluoride from thermal decomposition and hydrolysis.

SECTION 11. Toxicological information

11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008

Information on possible

routes of exposure:	Inhalation
	Skin contact
	Eye contact

a. Acute toxicity

Not classified according to available information.

Components:

Trans-1,3,3,3-Tetrafluoroprop-1-ene:

Acute toxicity by inhalation: CL50 (Rat): > 207.000 ppm
Exposure time: 4 h
Atmosphere test: gas
Method: Test guidelines OECD 403

Difluoromethane:

Acute oral toxicity: Assessment: The substance or mixture does not exhibit acute oral toxicity.
Acute toxicity by inhalation: CL50 (Rat): > 520.000 ppm
Exposure time: 4 h
Atmospheric test: gas
Method: Test guidelines OECD 403
Concentration with no adverse effects observed (dog): 350.000 ppm
Atmosphere test: gas
Observations: Cardiac awareness
Concentration with few adverse effects observed (dog) : > 350.000 ppm
Atmosphere test: gas
Observations: Cardiac awareness
Cardiac sensitization threshold limit (dog): > 735.000 mg/m³
Atmosphere test: gas
Observations: Cardiac awareness

1,1-Difluoroethane:

Acute toxicity by inhalation: CL50 (Rat): > 437.500 ppm
Exposure time: 4 h
Atmospheric test: gas
Concentration with no adverse effects observed (dog): 50.000 ppm
Atmosphere test: gas
Observations: Cardiac awareness
Concentration with few adverse effects observed (dog): > 150.000 ppm.
Atmosphere test: gas
Observations: Cardiac awareness
Cardiac sensitization threshold limit (dog): > 405.000 mg/m³
Atmosphere test: gas
Observations: Cardiac awareness
Acute dermal toxicity: Assessment: The mixture does not present any acute skin toxicity.

b. Skin corrosion/irritation

Not classified according to available information.

Components:

Trans-1,3,3,3-Tetrafluoroprop-1-ene:

Species: Rabbit
Method: Test Guideline OECD 404
Result: No skin irritation.

Difluoromethane:

Result: No skin irritation.

1,1- Difluoromethane:

Result: No skin irritation.

c. Serious eye damage/irritation

Not classified according to available information.

Components:

Trans-1,3,3,3-Tetrafluoroprop-1-ene:

No data available: The study is not technically feasible..

Difluoromethane:

Result: Does not irritate the eyes

1,1- Difluoromethane:

Result: Does not irritate the eyes

d. Respiratory or skin sensitization

Skin sensitization

Not classified according to available information.

Respiratory awareness

Not classified according to available information.

Componentes:

Trans-1,3,3,3-Tetrafluoroprop-1-ene:

Species: Humans

Result: Does not cause skin sensitization.

Difluoromethane:

Exposure routes: Skin contact

Result: Negative

1,1- Difluoromethane:

Species: Rat

Result: Negative

e. Germ cell mutagenicity

Not classified according to available information.

Componentes:

Trans-1,3,3,3-Tetrafluoroprop-1-ene:

In vitro genotoxicity:

Test Type: Reverse mutation test in bacteria (Ames test).

Method: Test Guideline OECD 471

Result: Negative

Type of test: In vitro chromosome aberration test

Method: Test Guideline OECD 471

Result: Negative

In vivo genotoxicity:

Test type: Mutagenicity in mammalian bone marrow, chromosome analysis (in vivo cytogenetic assay)

Species: Mouse

Cell type: Micronuclei

Route of Administration: Inhalation (gas)

Method: Test Guideline 474 del OECD

Result: Negative

Difluoromethane:

In vitro genotoxicity:

Test type: Reverse mutation test in bacteria (Ames test)

Method: Test Guideline OECD 471

Result: Negative

Type of test: In vitro chromosome aberration test

Method: Test Guideline OECD 473

Result: Negative

In vivo genotoxicity:

Test Type: Micronucleus test in mammalian erythrocytes (in vivo cytogenetic assay)

Species: Mouse

Route of application: inhalation (gas)

Method: Test Guideline OECD 474

Result: Negative

1,1- Difluoromethane:

In vitro genotoxicity:

Test type: Reverse mutation test in bacteria (Ames test) Método: Directrices de

Method: Test Guideline OECD 471

Result: Negative

Type of test: In vitro chromosome aberration test.

Method: Test Guideline OECD 473

Result: Weak clastogenicity detected in human lymphocytes.

In vivo genotoxicity:

Test Type: Micronucleus test in mammalian erythrocytes (in vivo)

cytogenetic assay)
Species: Rat
Route of application: inhalation (gas)
Method: Test Guideline OECD 474
Result: Negative (no evidence of micronuclei in vivo).
Assessment: The weight of evidence does not support classification as a germ cell mutagen.

Mutagenicity in germ cells:

f. Carcinogenicity

Not classified according to available information.

g. Reproductive toxicity

Not classified according to available information.

Components:

Trans-1,3,3,3-Tetrafluoroprop-1-ene:

Effects on fertility: Test type: Two-generation reproductive toxicity study
Species: Rat
Route of application: Inhalation
Method: Test Guideline OECD 416
General toxicity in parents: NOEL: > 20.000 ppm
General toxicity F1: NOEL: > 20.000 ppm

Effects on fetal development: Species: Rat
Route of application: Inhalation
Method: Test Guideline OECD 414
General maternal toxicity: NOEC: 15.000 ppm
Developmental toxicity: NOAEC: 15.000 ppm

Difluoromethane:

Effects on fertility: Species: Mouse
Route of application: Inhalation
Result: Negative
Observations: Based on data from similar materials.

Effects on fetal development: Test Type: Repeated dose toxicity study combined with reproductive/developmental toxicity screening test
Species: Rat
Route of application: inhalation (gas)
Method: Test Guideline OECD 414
Result: Negative
Test Type: Repeated dose toxicity study combined with reproductive/developmental toxicity screening test
Species: Rabbit
Route of application: Inhalation (gas)
Method: Test Guideline OECD 414
Result: Negative

1,1- Difluoromethane:

Effects on fertility: Test Type: Lethal dominance test in rodents, antifertility, and germ cell mutation.
Species: Mouse
Route of application: Inhalation (vapor)
Method: Test Guideline OECD 478
Result: Negative
Remarks: Based on data from similar materials.

Reproductive toxicity: Assessment: The weight of evidence does not support classification for reproductive toxicity.

h. STOT - single exposure

Not classified according to available information.

Components:

Trans-1,3,3,3-Tetrafluoroprop-1-ene:

Not classified according to available information.

Difluoromethane:

Route of exposure: inhalation (gas)

Assessment: No significant health effects were observed in animals at concentrations of 20,000 ppmV/4h or less.

1,1- Difluoromethane:

Not classified according to available information.

i. STOT - repeated exposure

Not classified according to available information.

Components:

Trans-1,3,3,3-Tetrafluoroprop-1-ene:

Exposure routes: inhalation (gas)

Assessment: No significant effects were observed in animals exposed to concentrations of up to 5,000 ppm/6h/d/5d/week. At higher concentrations, mild and reversible effects on the heart were detected.

Difluoromethane:

Route of exposure: inhalation (gas)

Assessment: No significant health effects were observed in animals at concentrations of 250 ppmV/6h/d or less.

1,1- Difluoromethane:

Exposure routes: inhalation (gas)

Assessment: No significant health effects were observed in animals at Concentrations of 1 mg/l/6h/d or less.

j. Aspiration hazard

Not classified according to available information.

11.2. Information on other hazards

a. Endocrine-disrupting properties

Assessment:

The mixture does not contain components that have endocrine-disrupting properties in accordance with Article 57(f) of REACH or Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

SECTION 12. Ecological information

12.1. Toxicity

Components:

Trans-1,3,3,3-Tetrafluoroprop-1-ene:

Toxicity to fish: CL0 (Cyprinus carpio (Carp)): > 117 mg/l

Exposure time: 96 h

Method: Test Guideline OECD 203

Toxicity to daphnia

and other aquatic invertebrates: CE50 (Daphnia magna (Large sea flea)): > 160 mg/l

Exposure time: 48 h

Method: Test guidelines of the OECD 202

Toxicity to

algae/aquatic plants:

ErC50 (Green algae): > 170 mg/l

Exposure time:: 72 h

Method: Testing Guideline of the OCDE 201

NOEC (Green algae): > 1 mg/l

Exposure time:: 72 h

Method: Testing Guideline of the OCDE 201

Difluoromethane:

Toxicity to fish:

CL50 (Fish): 1,507 mg/l

	Exposure time: 96 h Method: ECOSAR (Ecological Structure Activity Relationships)
Toxicity to daphnia and other aquatic invertebrates:	CE50 (Daphnia (Dafnia)): 652 mg/l Exposure time:: 48 h Method: ECOSAR (Ecological Structure Activity Relationships)
Toxicity to algae/aquatic plants:	CE50 (algas verdes): 142 mg/l Exposure time: 96 h Method: ECOSAR (Ecological Structure Activity Relationships)
1,1- Difluoromethane:	
Toxicity to fish:	CL50 (Pez): > 295,78 mg/l Exposure time: 96 h Method: ECOSAR (Ecological Structure Activity Relationships)
Toxicity to daphnia and other aquatic invertebrates:	CE50 (Daphnia (Dafnia)): > 146,7 mg/l Exposure time:: 48 h Method: ECOSAR (Ecological Structure Activity Relationships)
Toxicity to algae/aquatic plants:	CE50 (algas): > 47,76 mg/l Exposure time: 96 h Method: ECOSAR (Ecological Structure Activity Relationships)

12.2. Persistence and degradability

Components:

Trans-1,3,3,3-Tetrafluoroprop-1-ene:

Biodegradability: Result: Not readily biodegradable.

Difluoromethane:

Biodegradability: Result: Not readily biodegradable.

1,1- Difluoromethane:

Biodegradability: Result: Not readily biodegradable.

12.3. Bioaccumulation potential

Components:

Trans-1,3,3,3-Tetrafluoroprop-1-ene:

Bioaccumulation: Remarks: Bioaccumulation is unlikely. Partition coefficient (n-octanol/ water): log Pow: ≤ 4

Difluorometano:

Coefficiente de partición
(n-octanol/ water): log Pow: 0,714

1,1-Difluoroetano:

Coefficiente de partición
(n-octanol/ water): log Pow: -0,125

12.4. Mobility in soil

No data available.

12.5. Results on PBT and vPvB assessment

Assessment: This mixture does not contain components that are considered to be persistent, bioaccumulative, and toxic (PBT) or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6. Endocrine disruption properties

Assessment: The mixture does not contain components that have endocrine-disrupting properties according to Article 57(f) of REACH or Commission Delegated

Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

12.7. Other adverse effects

Global warming potential

Regulation (EU) No. 2024/573 on fluorinated greenhouse gases

Product:

Global warming potential in 100 years: 88

SECTION 13. Disposal considerations

13.1. Waste treatment methods

Product: Dispose of in accordance with local regulations. However, this product should be recycled or regenerated whenever possible.

Contaminated packaging: Empty pressure containers must be returned to the supplier. Operate in accordance with current local and national regulations.

13.2. Other information

Provisions relating to waste:

Directive 2006/12/CE; Directive 2008/98/CE
CE Regulation No. 1013/2006

Personal protective equipment, see section 8.

SECCIÓN 14. Transport information

14.1. UN number or ID number

ADN: 3161
ADR: 3161
RID: 3161
IATA: 3161
IMDG: 3161

14.2. UN proper shipping name

ADR/ADN/RID: FLAMMABLE LIQUEFIED GAS, N.O.S.
(2,3,3,3- TETRAFLUOROPROPENO/ DIFLUOROMETANO)

IMDG: FLAMMABLE LIQUEFIED GAS, N.O.S.
(2,3,3,3- TETRAFLUOROPROPENO/ DIFLUOROMETANO)

IATA (Cargo): Flammable liquefied gas, n.o.s.
(2,3,3,3-Tetrafluoropropeno/ Difluorometano)

IATA (Passenger): Flammable liquefied gas, n.o.s.
Not permitted for transport

14.3. Transport hazard class(es)

	<u>Class</u>	<u>Subsidiary risks</u>	<u>Classification code</u>	<u>Hazard identification number</u>	<u>Restricted tunnel code</u>
ADR:	2	2.1	2F	23	(B/D)
ADN:	2	2.1	2F	23	
RID:	2	2.1, (13)	2F	23	
IMDG:	2.1				
IATA:	2.1 (cargo)				
IATA:	Not permitted for transport (passengers)				

14.4. Packing group

Not assigned by regulation.

Tags

ADR/ADN/RID/IMDG: 2.1



IMDG / IATA: Flammable Gas

Packing instructions

IATA (load): 200

IATA (passengers): Not permitted for transport

Code EmS

IMDG: F-D, S-U

14.5. Environmental hazards

Not: (ADR/ADN/RID/IMDG)

14.6. Special precautions for user

The transport classification(s) listed are for informational purposes only and are based solely on the properties of the unpackaged/unpackaged material described in this Safety Data Sheet. Transport classifications may vary depending on the mode of transport, the size of the container/packaging, and variations in regional or country regulations.

14.7. Maritime transport in bulk according to IMO instruments

Not applicable.

SECTION 15. Regulatory Information

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

REACH-Restrictions on the manufacture, placing on the market and use of certain hazardous substances, mixtures and articles (Annex XVII):

Not applicable

REACH-List of candidate substances of very high concern for authorization (Article 59):

This product does not contain substances of very high concern above the corresponding legal concentration limit ($\geq 0.1\%$ w/w).

Regulation (EC) 1005/2009 on substances that deplete the ozone layer:

Not applicable

Regulation (EU) 2019/1021 on persistent organic pollutants (recast):

Not applicable

Regulation (EC) 649/2012 of the European Parliament and of the Council concerning the export and import of dangerous chemicals:

Not applicable

REACH-List of substances subject to authorization (Annex XIV):
Not applicable

Seveso III: Directive 2012/18/EU of the European Parliament and of the Council on the control of major-accident hazards involving dangerous substances:

P2	LIQUEFIED FLAMMABLE GASES	Quantity 1 10t	Quantity 2 50t
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Regulation (EC) No. 2024/573 of the European Parliament and of the Council on certain fluorinated greenhouse gases:

The fluorinated greenhouse gas R-444A must be supplied in returnable containers (drums/cylinders). The container contains fluorinated greenhouse gases regulated by the Kyoto Protocol. Fluorinated greenhouse gases in containers or cylinders must not be vented into the atmosphere.

15.2. Chemical safety assessment

A chemical safety assessment has been carried out for the substances that make up the product.

SECTION 16. Other information

This sheet cancels and replaces all previous editions.

Date of issue: 18 jun 2025

Version: 2.1

This Safety Data Sheet has been prepared in accordance with:

Regulation (EC) No. 1907/2006 and its subsequent amendments: Regulation (EU) No. 2015/830 and Regulation (EU) No. 2020/878

Text of the phrases used in section 3:

H221: Flammable gas.

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

This document has been prepared by a competent person who has received adequate training.

The information provided herein is based on our knowledge as of the date indicated above. It refers exclusively to the product indicated and does not constitute a guarantee of particular qualities.

The user must ensure that this information is suitable and accurate for the specific use of the product.

The information is considered correct, but is not exhaustive and should be used only as a guide, based on current knowledge of the chemical substance or mixture and applicable to the appropriate safety precautions for the product.

The list of risks, legal, regulatory, and administrative texts is not exhaustive. The recipient or user of the product is solely responsible for referring to the official regulations for the storage, handling, and use of these products.

Glossary of abbreviations

ADN: European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways.

ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road.

CMR: Carcinogenic, mutagenic or toxic to reproduction.

DIN: German Institute for Standardization standard.

CEx: Concentration associated with x% response.

EmS: Emergency procedure.

GHS: Globally Harmonized System of Classification and Labelling of Chemicals.

IATA: International Air Transport Association.

IBC: International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk.

IMDG: International Maritime Dangerous Goods Code.

LC: Lower acute toxicity.

LC50: Concentration lethal to 50% of a test population.

NOAEL: No observable adverse effect level.

NOEL: No observable effect level.

NOELR: No observable effect rate.

IMO: International Maritime Organization.

RID: Regulations concerning the International Carriage of Dangerous Goods by Rail (COTIF).

UN: United Nations.

ELV: Environmental Limit Values.

UNRTDG: United Nations Recommendations on the Transport of Dangerous Goods.