

1. IDENTIFICATION OF THE SUBSTANCE / MIXTURE AND OF THE COMPANY / UNDERTAKING

Product identifier

Product Name Zephex™ 227ea

Use Subject to Member State regulations, applicable uses are:
medical propellant

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2. HAZARDS IDENTIFICATION

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.

Classification of the substance or mixture

Regulation (EC) No. 1272/2008 (CLP) Gases under pressure - Liquefied gas

Label elements

According to Regulation (EC) No. 1272/2008 (CLP)

Hazard Pictogram(s)



Signal Word(s)

Warning

Hazard Statement(s)

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

Precautionary Statement(s)

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

3. COMPOSITION / INFORMATION ON INGREDIENTS

Alternative names HFA 227ea 1,1,1,2,3,3,3-Heptafluoropropane (HFC 227ea)

Hazardous Ingredient(s)

Hazardous Ingredient(s)	%(w/w)	CAS No.	EC No.	Hazard symbol(s) and hazard statement(s)
1,1,1,2,3,3,3-Heptafluoropropane (HFC 227ea)	100	000431-89-0	207-079-2	GHS04; H280

4. FIRST AID MEASURES



The first aid advice given for skin contact, eye contact, and ingestion is applicable following exposures to the liquid or spray. See also section 11.

Description of first aid measures

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.

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.

Eye Contact

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

Ingestion

Unlikely 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.

Further Medical Treatment

Symptomatic treatment and supportive therapy as indicated. Adrenaline and similar sympathomimetic drugs should be avoided following exposure as cardiac arrhythmia may result with possible subsequent cardiac arrest.

Most important symptoms and effects, both acute and delayed

High exposures may cause an abnormal heart rhythm and prove suddenly fatal. Very high atmospheric concentrations may cause anaesthetic effects and asphyxiation.

Indication of any immediate medical attention and special treatment needed

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.

5. FIREFIGHTING MEASURES

General

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

Extinguishing media

As appropriate for surrounding fire.
Keep fire exposed containers cool by spraying with water.

Special hazards arising from the substance or mixture

Thermal decomposition will evolve very toxic and corrosive vapours. (hydrogen fluoride) Containers may burst if overheated.

Advice for firefighters

A self contained breathing apparatus and full protective clothing must be worn in fire conditions. See Also Section 8

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Ensure suitable personal protection (including respiratory protection) during removal of spillages. See Also Section 8

Environmental precautions

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

Methods and materials 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. Prevent liquid from entering drains, sewers, basements and workpits since the vapour may create a suffocating atmosphere.

Reference to other sections

8, 13

7. HANDLING AND STORAGE

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.

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.

Avoid venting to atmosphere.

The fluorinated greenhouse gas HFA 227ea may be supplied in returnable containers (drums/cylinders). The container contains fluorinated greenhouse gases covered by the Kyoto Protocol. The fluorinated greenhouse gases in containers may not be vented to the atmosphere. Regulation (EU) No. 517/2014 of the European Parliament and the Council on certain fluorinated greenhouse gases.

Process Hazards

The transfer of liquid gases between containers and to and from processing equipment can result in static generation. Ensure adequate earthing.

Care must be taken to mitigate the risk of developing high pressures in systems caused by a temperature rise when liquid is trapped between closed valves or in cases where containers have been overfilled.

Conditions for safe storage, including any incompatibilities

Keep in a well ventilated place away from fire risk and avoid sources of heat such as electric or steam radiators.

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

Specific use

Subject to Member State regulations, applicable uses are:
medical propellant

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure controls

Occupational Exposure Limits

Safety Data Sheet

Occupational Exposure Limits	CAS No.	LEL (8 hr TWA ppm)	LEL 8 hr TWA mg/m ³	STEL (ppm)	STEL mg/m ³	Note
1,1,1,2,3,3,3-Heptafluoropropane (HFC 227ea)	000431-89-0	1000	-	-	-	COM

Appropriate engineering controls

Provide adequate ventilation. Atmospheric levels should be controlled in compliance with the proposed occupational exposure limit.

Personal protection equipment

Wear suitable protective clothing, gloves and eye/face protection.

Respirators

In cases of insufficient ventilation, where exposure to high concentrations of vapour is possible, suitable respiratory protective equipment with positive air supply should be used.

Eye Protection

Wear protective eyewear (goggles, face shield, or safety glasses).

Gloves

Wear thermal insulating gloves when handling liquefied gases.

9. PHYSICAL AND CHEMICAL PROPERTIES

Form	liquefied gas
Colour.	colourless
Odour	slight ethereal
Solubility (Water)	slightly soluble
Solubility (Other)	soluble in: alcohols , chlorinated solvents , esters
Boiling Point (° C)	-16.4
Melting Point (° C)	-131
Vapour Density (Air=1)	6.04
Vapour Pressure (mm Hg)	3040 at 21° C
Specific Gravity	1.46

10. STABILITY AND REACTIVITY

Reactivity

See Section: Possibility of hazardous reactions

Chemical stability

Stable under normal conditions.

Possibility of hazardous reactions

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

Incompatible materials: finely divided metals , magnesium and alloys containing more than 2% magnesium . Can react violently if in contact with alkali metals and alkaline earth metals - sodium , potassium , barium.

Conditions to avoid

Avoid high temperatures.

Incompatible materials

Finely divided metals, alkali metals (sodium, potassium), alkaline earth metals (barium, magnesium), alloys containing more than 2% magnesium

Hazardous decomposition products

Hydrogen fluoride by thermal decomposition and hydrolysis.

11. TOXICOLOGICAL INFORMATION

Acute toxicity / Ingestion	Highly unlikely - but should this occur freeze burns will result.
Inhalation / Acute toxicity	LC50 (rat) (4 hrs)> 788696 ppm High exposures may cause an abnormal heart rhythm and prove suddenly fatal. Very high atmospheric concentrations may cause anaesthetic effects and asphyxiation.
Acute toxicity / Skin Contact	Unlikely to be hazardous by skin absorption.
Skin corrosion/irritation	Liquid splashes or spray may cause freeze burns.
Serious eye damage/irritation	Liquid splashes or spray may cause freeze burns.
Respiratory irritation	Non-irritant
Sensitisation	It is not a skin sensitiser.
Repeated dose toxicity	A lifetime inhalation study in rats exposed to very high concentrations of HFC 227ea did not produce any adverse effects.
Mutagenicity	No evidence of mutagenic effects.
Carcinogenicity	No evidence of carcinogenic effects. A lifetime inhalation study in rats exposed to very high concentrations of HFC 227ea did not produce any adverse effects.
Reproductive toxicity	No adverse reproductive or developmental effects were observed in rats and rabbits exposed to very high concentrations of HFC 227ea.
Specific target organ toxicity (single exposure)	Not classified
Specific target organ toxicity (repeated exposure)	Not classified
Aspiration hazard	Not applicable

12. ECOLOGICAL INFORMATION

Toxicity	The product is predicted to have low toxicity to aquatic organisms.
Environmental Fate and Distribution	High tonnage material produced in wholly contained systems. High tonnage material used in open systems. Gas.
Persistence and Degradation	Decomposed comparatively rapidly in the lower atmosphere (troposphere). Atmospheric lifetime is 34.2 years. 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). Does not deplete ozone. Has a Global Warming Potential (GWP) of 3220 (relative to a value of 1 for carbon dioxide at 100 years) according to Annex I of Regulation (EU) No. 517/2014 on certain fluorinated greenhouse gases. Values in Annex I are taken from the fourth assessment report (AR4) of the Intergovernmental Panel on Climate Change. United Nations Framework Convention on Climate Change (UNFCCC) reporting GWP is 2900.

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Bioaccumulative potential	The product has no potential for bioaccumulation.
Mobility in soil	Not applicable
Results of PBT and vPvB assessment	Not classified as PBT or vPvB.
Other adverse effects	None known.
Effect on Effluent Treatment	Discharges of the product will enter the atmosphere and will not result in long term aqueous contamination.

13. DISPOSAL CONSIDERATIONS

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.
Regulatory Information	Disposal should be in accordance with local, state or national legislation.

14. TRANSPORT INFORMATION

Hazard label(s)



Road/Rail

UN No.	3296
ADR/RID Class	2.2
ADR/RID Proper Shipping Name	HEPTAFLUOROPROPANE (REFRIGERANT GAS R 227)

SEA

IMDG Class	2.2
Marine Pollutant	Not classified as a Marine Pollutant

AIR

ICAO/IATA Class	2.2
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15. REGULATORY INFORMATION

European Regulations

EC Classification	According to Regulation (EC) No. 1272/2008 (CLP) Gases under pressure - Liquefied gas.
Special Restrictions:	The fluorinated greenhouse gas HFA 227ea may be supplied in returnable containers (drums/cylinders). The container contains fluorinated greenhouse gases covered by the Kyoto Protocol. The fluorinated greenhouse gases in containers may not be vented to the atmosphere. Regulation (EU) No. 517/2014 of the European Parliament and the Council on certain fluorinated greenhouse gases.

16. OTHER INFORMATION

This data sheet was prepared in accordance with Regulation (EC) No. 1907/2006.

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Glossary

WEL: Workplace Exposure Limit (UK HSE EH40)

COM: The company aims to control exposure in its workplace to this limit

TLV: The company aims to control exposure in its workplace to the ACGIH limit

TLV-C: The company aims to control exposure in its workplace to the ACGIH Ceiling limit

MAK: The company aims to control exposure in its workplace to the German limit

Sk: Can be absorbed through skin

Sen: Capable of causing respiratory sensitisation

Bmgv: Biological monitoring guidance value (UK HSE EH40)

Hazard Statement(s)

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

The following sections contain revisions or new statements:

2,4,5,6,7,8,10,11,12,13,15

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