SAFETY DATA SHEET

Refrigerant Gas R449A

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

1.1. Product identifier

Trade name: Refrigerant Gas R449A

Other names / Synonyms: Opteon XP40

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

Relevant identified uses of the substance or mixture: Refrigerant
Restricted to professional users.

Uses advised against : None known.

1.3. Details of the supplier of the safety data sheet

Company and address:

National Refrigerants Limited
4 Watling Close
Sketchley Meadows Business Park

LE10 3EZ Hinckley
England
+44 (0)1455 630 790
www.nationalref.com

Contact person: sds@nationalref.com

Revision: 08/09/2025

SDS Version: 1.0

1.4. Emergency telephone number

Healthcare professionals: Dial 0344 892 0111 to reach The National Poisons Information Service (NPIS) (24 hour service)
General public:
England - Dial 111 to reach NHS 111 (24 hour service)
Scotland - Dial 111 to reach NHS 24 (24 hour service)
Wales - Dial 111 or 0845 4647 to reach NHS Direct (24 hour service)
See section 4 “First aid measures”.

SECTION 2: HAZARDS IDENTIFICATION

Classified according to Regulation (EC) No. 1272/2008 (CLP) as retained and amended in UK law.

2.1. Classification of the substance or mixture

Press. Gas (Liq.) ; H280, Contains gas under pressure; may explode if heated.

2.2. Label elements

Hazard pictogram(s):

Signal word: Warning

Hazard statement(s): Contains gas under pressure; may explode if heated. (H280)

Precautionary statement(s):

General: Not applicable.

Prevention: Not applicable.

Response: Not applicable.

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

Disposal: Not applicable.

Hazardous substances: Does not contain any substances required to report

Additional labelling:

2.3. Other hazards

Additional warnings: In the event of leaks, high concentrations of gases can quickly form. They can be toxic, asphyxiating, or explosive.
This mixture/product does not contain any substances known to fulfil the criteria for PBT and vPvB classification.
This product does not contain any substances considered to be endocrine disruptors in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2023/707.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1. Substances

Not applicable. This product is a mixture.

3.2. Mixtures

Product/substance	Identifiers	% w/w	Classification	Note
1,1,1,2-tetrafluoroethane (HFC-134a)	CAS No.: 811-97-2 EC No.: 212-377-0 UK-REACH: UK-20-0812279581-1-0000 Index No.:	25-40%	EUH044 Press. Gas (Liq.) , H280	
2,3,3,3-Tetrafluoroprop-1-ene	CAS No.: 754-12-1 EC No.: 468-710-7 UK-REACH: Index No.:	25-40%	Flam. Gas 1B, H221 Press. Gas (Liq.) , H280	

Pentafluoroethane (HFC-125)	CAS No.: 354-33-6 EC No.: 206-557-8 UK-REACH: Index No.:	15-25%	Press. Gas (Liq.) , H280	
Difluoromethane HFC-32	CAS No.: 75-10-5 EC No.: 200-839-4 UK-REACH: Index No.:	15-25%	Flam. Gas 1B, H221 Press. Gas (Liq.) , H280	

See full text of H-phrases in section 16. Occupational exposure limits are listed in section 8, if these are available.

Other information

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SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

General information: In the case of accident: Contact a doctor or casualty department – take the label or this safety data sheet. Contact a doctor if in doubt about the injured person's condition or if the symptoms persist. Never give an unconscious person water or other drink.

Inhalation: Upon breathing difficulties or irritation of the respiratory tract: Bring the person into fresh air and stay with him/her.

Skin contact: Exposure is not likely due to the physical state of the product (gas).

Eye contact: If in eyes: Flush eyes with water or saline water (20-30 °C) for at least 5 minutes. Remove contact lenses. Seek medical assistance and continue flushing during transport.

Ingestion: Exposure is not likely due to the physical state of the product (gas).

Burns: Rinse with water until pain stops then continue to rinse for 30 minutes.

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

None known.

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

Treat symptomatically.

Information to medics

Bring this safety data sheet or the label from this product.

SECTION 5: FIREFIGHTING MEASURES

5.1. Extinguishing media

Suitable extinguishing media: Alcohol-resistant foam, carbon dioxide, powder, water mist.
Unsuitable extinguishing media: Waterjets should not be used, since they can spread the fire.

5.2. Special hazards arising from the substance or mixture

Contains gas under pressure; may explode if heated.
Given that it does not present a risk gas supplies shall be disrupted immediately. Removal of pressurized containers or attempting to cool with water shall be entrusted the fire brigade.
If the product is exposed to high temperatures, e.g. in the event of fire, dangerous decomposition compounds are produced. These are:
Halogenated compounds
Carbon oxides (CO / CO2)

5.3. Advice for firefighters

Wear self-contained breathing apparatus and protective clothing to prevent contact. Upon direct exposure contact The National Poisons Information Service (dial 111, 24 h service) in order to obtain further advice.
Hazchem Code: 2TE

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Accidental releases always pose a serious risk of fire or explosion.
Storages not yet ignited must be cooled by water mist. Remove flammable materials if conditions allow it. Ensure sufficient ventilation.
Disconnect the gas supply provided it does not present a risk. Avoid breathing fumes. Make sure to have a self-contained breathing apparatus available and ready-to-use in the event of an emergency.
Ensure adequate ventilation, especially in confined areas.

6.2. Environmental precautions

In the event of leakage to the surroundings, contact local environmental authorities.

6.3. Methods and material for containment and cleaning up

Disconnect the gas supply. Allow liquefied gas to evaporate and dilute into safe concentration levels in the surrounding atmosphere. If necessary control the dilution of the gas with a mist of water. Ventilate rooms in order to remove the gas.

6.4. Reference to other sections

See section 13 “Disposal considerations” on handling of waste.
See section 8 "Exposure controls/personal protection" for protective measures.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Smoking, drinking and consumption of food is not allowed in the work area.

See section 8 "Exposure controls/personal protection" for information on personal protection.

7.2. Conditions for safe storage, including any incompatibilities

Vapours may propagate along the floor. Prevent the forming of flammable or explosive vapour concentrations by applying sufficient ventilation. Do not use this product in close proximity to sources of ignition.
Protect electrical equipment in accordance with current standards. To divert static electricity during transmission, containers must be grounded and connected by wire with the receiving containers. Do not use spark-forming tools.
Pressurized gas packs (spray cans, aerosol cans) must be stored behind a wire mesh, which allows gases to escape and holds back packs flying around.

Recommended storage material:	Always store in containers of the same material as the original container.
Storage conditions:	< 50°C Dry, cool and well ventilated Protect from direct sunlight
Incompatible materials:	Strong acids Strong oxidizing agents Flammable liquids

7.3. Specific end use(s)

This product should only be used for applications quoted in section 1.2.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

1,1,1,2-tetrafluoroethane (HFC-134a)
Long term exposure limit (8 hours) (ppm): 1000
Long term exposure limit (8 hours) (mg/m³): 4240

2,3,3,3-Tetrafluoroprop-1-ene
Long term exposure limit (8 hours) (ppm): 500

Pentafluoroethane (HFC-125)
Long term exposure limit (8 hours) (ppm): 1000

Difluoromethane HFC-32
Long term exposure limit (8 hours) (ppm): 1000

The Control of Substances Hazardous to Health Regulations 2002. SI 2002/2677 The Stationery Office 2002.
EH40/2005 Workplace exposure limits (Fourth Edition 2020).

DNEL

1,1,1,2-tetrafluoroethane (HFC-134a)

Duration:	Route of exposure:	DNEL:
Long term – Systemic effects - General population	Inhalation	2476 mg/m³

Long term – Systemic effects - Workers	Inhalation	13936 mg/m³

2,3,3,3-Tetrafluoroprop-1-ene

Duration:	**Route of exposure:**	**DNEL:**
Long term – Systemic effects - Workers	Inhalation	950 mg/m³
Short term – Systemic effects - Workers	Inhalation	186400 mg/m³

Difluoromethane HFC-32

Duration:	**Route of exposure:**	**DNEL:**
Long term – Systemic effects - Workers	Inhalation	13936 mg/m³

Pentafluoroethane (HFC-125)

Duration:	**Route of exposure:**	**DNEL:**
Long term – Systemic effects - Workers	Inhalation	16444 mg/m³
Long term – Systemic effects - Workers	Inhalation	16444 mg/m³

PNEC

1,1,1,2-tetrafluoroethane (HFC-134a)

Route of exposure:	**Duration of Exposure:**	**PNEC:**
Freshwater		100 µg/L
Freshwater sediment		750 µg/kg
Intermittent release (freshwater)		1 mg/L
Marine water		10 µg/L
Sewage treatment plant		73 mg/L

2,3,3,3-Tetrafluoroprop-1-ene

Route of exposure:	**Duration of Exposure:**	**PNEC:**
Freshwater		100 µg/L
Freshwater sediment		1.51 mg/kg
Intermittent release (freshwater)		>1.77 mg/L
Marine water		10 µg/L
Marine water sediment		151 µg/kg
Soil		>1.54 mg/kg

Difluoromethane HFC-32

Route of exposure:	**Duration of Exposure:**	**PNEC:**
Freshwater		142 µg/L
Freshwater sediment		534 µg/kg

Pentafluoroethane (HFC-125)

Route of exposure:	**Duration of Exposure:**	**PNEC:**
Freshwater		100 µg/L
Freshwater sediment		600 µg/kg
Intermittent release (freshwater)		1 mg/L

8.2. Exposure controls

Compliance with the given occupational exposure limits values should be controlled on a regular basis.

General recommendations: Smoking, drinking and consumption of food is not allowed in the work area.

Exposure scenarios: There are no exposure scenarios implemented for this product.

Exposure limits: Professional users are subjected to the legally set maximum concentrations for occupational exposure. See occupational hygiene limit values above.

Appropriate technical measures: Adequate ventilation must be ensured for all gases. Where natural ventilation is not possible (cellar rooms), artificial ventilation must be installed. It is advantageous to store it in a lattice shed outdoors, as ventilation is no longer necessary in this case.

Hygiene measures: In between use of the product and at the end of the working day all exposed areas of the body must be washed thoroughly. Pay special attention to hands, forearms and face.

Measures to avoid environmental exposure: No special when used as intended.

Individual protection measures, such as personal protective equipment

Generally: Use only UKCA marked protective equipment.

Respiratory Equipment:

Work situation	Type	Class	Colour	Standards	
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.	Respiratory protection is not needed in the event of adequate ventilation.				

Skin protection:

Work situation	Recommended	Type/Category	Standards	
	Wear appropriate protection clothing, e.g. coveralls in polypropylene or working clothes in cotton or polyester.	-	-	

Work situation	Recommended	Type/Category	Standards	
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.	Wear appropriate protection clothing, e.g. coveralls in polypropylene or working clothes in cotton or polyester.	-	-	

Hand protection:

Material	Glove thickness (mm)	Breakthrough time (min.)	Standards	
Heat Resistant			EN374, EN511	

Eye protection:

Type	Standards	
Safety glasses with side shields.	EN166	
In the likelihood of direct or incidental exposure, use face protection.	EN166	

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Physical state: Gas

Colour: Clear

Odour / Odour threshold: Slight, ether-like

pH: No data available

Density (g/cm^3): Does not apply to gases.

Relative density: 1.1 (25 °C)

Kinematic viscosity: Not applicable

Particle characteristics: Not applicable

Phase changes

Melting point/Freezing point (°C): No data available

Softening point/range (°C): Does not apply to gases.

Boiling point (°C): -46

Vapour pressure:	12.748 hPa (25 °C)
Relative vapour density:	3.07 (Air=1)
Decomposition temperature (°C):	No data available

Data on fire and explosion hazards

Flash point (°C):	Not applicable - product is a gas
Flammability (°C):	The material is not combustible.
Auto-ignition temperature (°C):	No data available
Lower and upper explosion limit (% v/v):	Not applicable
Lower and upper explosion limit (mg/m^3):	Test method: ASTM E681

Solubility

Solubility in water:	No data available
n-octanol/water coefficient (LogKow):	No data available
Solubility in fat (g/L):	No data available

9.2. Other information

Evaporation rate (n-butylacetate = 100):	>1 (CCL4=1.0)
Oxidizing properties:	No data available.
Other physical and chemical parameters:	No data available.

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity
No data available.

10.2. Chemical stability
The product is stable under the conditions, noted in section 7 “Handling and storage”.

10.3. Possibility of hazardous reactions
None known.

10.4. Conditions to avoid
None known.

10.5. Incompatible materials
Strong acids
Strong oxidizing agents
Finely divided metals, alkali metals (sodium, potassium), alkaline earth metals (barium, magnesium), alloys containing more than 2% magnesium.

10.6. Hazardous decomposition products
Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008 as retained and amended in UK law

Acute toxicity

Product/substance	1,1,1,2-tetrafluoroethane (HFC-134a)
Species:	Rat
Route of exposure:	Inhalation
Test:	LC50 (4 hours)
Result:	567000 ppmV

Product/substance	Pentafluoroethane (HFC-125)
Species:	Rat
Route of exposure:	Inhalation
Test:	LC50 (4 hours)
Result:	800000 ppmV

Product/substance	Difluoromethane HFC-32
Species:	Rat
Test:	LD50
Result:	520000 ppmV

Product/substance	Difluoromethane HFC-32
Species:	Rat
Test:	LC50 (4 hours)
Result:	>400000 ppmV

Based on available data, the classification criteria are not met.

Skin corrosion/irritation

Product/substance	1,1,1,2-tetrafluoroethane (HFC-134a)
Other information:	No data available

Product/substance	Pentafluoroethane (HFC-125)
Result:	

There may be redness or whiteness of the skin in the are of exposure. Frost-bite may occur causing the affected area to become white and numb.

Based on available data, the classification criteria are not met.

Serious eye damage/irritation

Product/substance	1,1,1,2-tetrafluoroethane (HFC-134a)
Other information:	No data available

Product/substance	Pentafluoroethane (HFC-125)
Result:	There may be irritation and pain

Based on available data, the classification criteria are not met.

Respiratory sensitisation

Product/substance	1,1,1,2-tetrafluoroethane (HFC-134a)
Other information:	No data available

Product/substance	Pentafluoroethane (HFC-125)

Result:
Inhalation may produce the following symptoms: Shortness of breath, dizziness, weakness, nausea, headache, narcosis, irregular cardiac activity. Drowsiness or mental confusion may occur. There may be loss of consciousness.

Based on available data, the classification criteria are not met.

Skin sensitisation

Product/substance 1,1,1,2-tetrafluoroethane (HFC-134a)
Other information: No data available

Based on available data, the classification criteria are not met.

Germ cell mutagenicity

Product/substance 1,1,1,2-tetrafluoroethane (HFC-134a)
Test method: OECD 471
Conclusion: No adverse effect observed

Based on available data, the classification criteria are not met.

Carcinogenicity

Product/substance 1,1,1,2-tetrafluoroethane (HFC-134a)
Other information: Not classified based on available information.

Based on available data, the classification criteria are not met.

Reproductive toxicity

Product/substance 1,1,1,2-tetrafluoroethane (HFC-134a)
Species: Rabbit
Test: General Toxicity - Maternal: NOEL:
Result: 2,500 ppm

Product/substance 1,1,1,2-tetrafluoroethane (HFC-134a)
Species: Rabbit
Test: Embryo-foetal Toxicity: NOEL:
Result: 40,000 ppm

Based on available data, the classification criteria are not met.

STOT-single exposure

Product/substance Refrigerant Gas R449A
Other information: Not classified based on available information.

Product/substance 1,1,1,2-tetrafluoroethane (HFC-134a)
Other information: No data available

Based on available data, the classification criteria are not met.

STOT-repeated exposure

Product/substance Refrigerant Gas R449A
Other information: Not classified based on available information.

Product/substance 1,1,1,2-tetrafluoroethane (HFC-134a)
Other information: No data available

Based on available data, the classification criteria are not met.

Aspiration hazard

Product/substance Refrigerant Gas R449A

Other information: Not classified based on available information.

Product/substance 1,1,1,2-tetrafluoroethane (HFC-134a)
Other information: No data available

Based on available data, the classification criteria are not met.

11.2. Information on other hazards

Long term effects

None known.

Endocrine disrupting properties

Product/substance Refrigerant Gas R449A
Other information:
The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57f.

Product/substance 1,1,1,2-tetrafluoroethane (HFC-134a)
Other information: No data available

This mixture/product does not contain any substances known to have hormone-disrupting properties in relation to health.

Other information

None known.

SECTION 12: ECOLOGICAL INFORMATION

12.1. Toxicity

Product/substance 1,1,1,2-tetrafluoroethane (HFC-134a)
Species: Daphnia, Daphnia magna
Duration: 48 hours
Test: EC50
Result: 980 mg/L

Product/substance 1,1,1,2-tetrafluoroethane (HFC-134a)
Species: Fish, Oncorhynchus mykiss
Duration: 96 hours
Test: LC50
Result: 450 mg/L

Product/substance 1,1,1,2-tetrafluoroethane (HFC-134a)
Species: Algae, Selenastrum capricornutum
Duration: 72 hours
Test: ErC50
Result: 118 mg/L

Product/substance 2,3,3,3-Tetrafluoroprop-1-ene
Species: Algae
Duration: 96 hours
Test: LC50
Result: >100 mg/L

Product/substance	2,3,3,3-Tetrafluoroprop-1-ene
Species:	Daphnia, Daphnia magna
Duration:	48 hours
Test:	EC50
Result:	>83 mg/L

Product/substance	2,3,3,3-Tetrafluoroprop-1-ene
Species:	Fish
Duration:	96 hours
Test:	ErC50
Result:	>197 mg/L

Product/substance	Pentafluoroethane (HFC-125)
Other information:	No data available

Product/substance	Difluoromethane HFC-32
Species:	Algae
Duration:	96 hours
Test:	ErC50
Result:	142 mg/L

Product/substance	Difluoromethane HFC-32
Species:	Daphnia, Daphnia magna
Duration:	48 hours
Test:	EC50
Result:	652 mg/L

Product/substance	Difluoromethane HFC-32
Species:	Fish
Duration:	96 hours
Test:	LC50
Result:	1.507 mg/L

Based on available data, the classification criteria are not met.

12.2. Persistence and degradability

Based on available data, the classification criteria are not met.

12.3. Bioaccumulative potential

Product/substance	1,1,1,2-tetrafluoroethane (HFC-134a)
Conclusion:	-
Other information:	No data available

Product/substance	Pentafluoroethane (HFC-125)
Conclusion:	-
Other information:	No data available

Product/substance	Difluoromethane HFC-32
Conclusion:	Bioaccumulation is not expected

12.4. Mobility in soil

Difluoromethane HFC-32

LogKoc = 1.52, High mobility potential.

12.5. Results of PBT and vPvB assessment

This mixture/product does not contain any substances known to fulfil the criteria for PBT and vPvB classification.

12.6. Endocrine disrupting properties

Product/substance Refrigerant Gas R449A
Other information:
The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57f.

Product/substance 1,1,1,2-tetrafluoroethane (HFC-134a)
Other information: No data available

Product/substance Difluoromethane HFC-32
Other information:
The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57f.

This mixture/product does not contain any substances considered to have endocrine-disrupting properties in relation to the environment.

12.7. Other adverse effects

-
Contains fluorinated greenhouse gases covered by the Kyoto Protocol.
Contains fluorinated greenhouse gases covered by the Kyoto Protocol: Global Warming Potential (GWP) 1397

SECTION 13: DISPOSAL CONSIDERATIONS

Waste treatment methods

Product is covered by the regulations on hazardous waste. (*)
Regulation (EU) No 1357/2014 of 18 December 2014 on waste as retained and amended in UK law.

EWC code

14 06 01* Dispose of in accordance with local regulations.

Specific labelling

Contaminated packing

EWC code: 16 05 04*
Empty pressure vessels should be returned to the supplier

SECTION 14: TRANSPORT INFORMATION

	14.1 UN / ID	14.2 UN proper shipping name	14.3 Hazard class(es)	14.4 PG*	14.5 Env**	Other information:
ADR	UN1078	REFRIGERANT GAS, N.O.S. (1,1,1,2-tetrafluoroethane (HFC-134a), 2,3,3,3-Tetrafluoroprop-1-ene)	Transport hazard class: 2 Label: 2.2 Classification code: 2A	-	No	Limited quantities: 120 ml Tunnel

	14.1 UN / ID	14.2 UN proper shipping name	14.3 Hazard class(es)	14.4 PG*	14.5 Env**	Other information:
						restriction code: (C/E) See below for additional information.
IMDG	UN1078	REFRIGERANT GAS, N.O.S. (1,1,1,2-tetrafluoroethane (HFC-134a), 2,3,3,3-Tetrafluoroprop-1-ene)	Transport hazard class: 2 Label: 2.2 Classification code: 2A 	-	No	Limited quantities: 120 ml EmS: F-C S-V See below for additional information.
IATA	UN1078	REFRIGERANT GAS, N.O.S. (1,1,1,2-tetrafluoroethane (HFC-134a), 2,3,3,3-Tetrafluoroprop-1-ene)	Transport hazard class: 2 Label: 2.2 Classification code: 2A 	-	No	See below for additional information.

* Packing group

** Environmental hazards

Additional information

This product is within scope of the regulations of transport of dangerous goods.
ADR / See Table A, section 3.2.1 for any information on special provisions, requirements, or warnings in connection with transport. See section 5.4.3, for instructions in writing regarding mitigation of damages in relation to incidents or accidents during transport.
IMDG / See section 3.2.1, for any information on special provisions, requirements, or warnings in connection with transport.
IATA / See Table 4.2 for any information on special provisions, requirements, or warnings in connection with transport.
Hazchem Code: 2TE

14.6. Special precautions for user

Not applicable.

14.7. Maritime transport in bulk according to IMO instruments

No data available.

SECTION 15: REGULATORY INFORMATION

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

Restrictions for application:	Restricted to professional users.
Demands for specific education:	No specific requirements.
Control of Major Accident Hazards (COMAH) - Categories / dangerous substances:	Not applicable.
UK-REACH, Annex XVII:	2,3,3,3-Tetrafluoroprop-1-ene is subject to UK-REACH restrictions (entry 40). Difluoromethane HFC-32 is subject to UK-REACH restrictions (entry 40).
Additional information:	Not applicable.
Sources:	Regulation (EU) No 1357/2014 of 18 December 2014 on waste as retained and amended in UK law. The Fluorinated Greenhouse Gases (Amendment) Regulations 2023 Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures (CLP) as retained and amended in UK law. Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) as retained and amended in UK law.

15.2. Chemical safety assessment

No

SECTION 16: OTHER INFORMATION

Full text of H-phrases as mentioned in section 3

EUH044, Risk of explosion if heated under confinement.
H221, Flammable gas
H280, Contains gas under pressure; may explode if heated.

Abbreviations and acronyms

ADN = European Provisions concerning the International Carriage of Dangerous Goods by Inland Waterway
ADR = The European Agreement concerning the International Carriage of Dangerous Goods by Road
ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
CAS = Chemical Abstracts Service
CE = Conformité Européenne (European conformity)
CLP = Classification, Labelling and Packaging Regulation [Regulation (EC) No. 1272/2008]
CSA = Chemical Safety Assessment
CSR = Chemical Safety Report
DMEL = Derived Minimal Effect Level
DNEL = Derived No Effect Level
EINECS = European Inventory of Existing Commercial chemical Substances

ES = Exposure Scenario
EUH statement = CLP-specific Hazard statement
EuPCS = European Product Categorisation System
EWC = European Waste Catalogue
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
GWP = Global warming potential
IARC = International Agency for Research on Cancer (IARC)
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
OECD = Organisation for Economic Co-operation and Development
PBT = Persistent, Bioaccumulative and Toxic
PNEC = Predicted No Effect Concentration
RID = The Regulations concerning the International Carriage of Dangerous Goods by Rail
RRN = REACH Registration Number
SCL = A specific concentration limit
SVHC = Substances of Very High Concern
STOT-RE = Specific Target Organ Toxicity - Repeated Exposure
STOT-SE = Specific Target Organ Toxicity - Single Exposure
TWA = Time weighted average
UN = United Nations
UVBC = Unknown or variable composition, complex reaction products or of biological materials
VOC = Volatile Organic Compound
vPvB = Very Persistent and Very Bioaccumulative

Additional information

The classification of the mixture in regard to physical hazards has been based on experimental data.

The safety data sheet is validated by

National Refrigerants Ltd

Other

A change (in proportion to the last essential change (first cipher in SDS version, see section 1)) is marked with a triangle.
The information in this safety data sheet applies only to this specific product (mentioned in section 1) and is not necessarily correct for use with other chemicals/products.
It is recommended to hand over this safety data sheet to the actual user of the product.
Information in this safety data sheet cannot be used as a product specification.
Country-language: GB-en