SAFETY DATA SHEET

REFRIGERANT R454B

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

1.1. Product identifier

Trade name:	REFRIGERANT R454B
Other names / Synonyms:	OPTEON XL41
Product no.:	R454B

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:	15/08/2025
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”.
Emergency Telephone: Carechem24 +44 (0)1865 407333

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

Flam. Gas 1B; H221, Flammable gas
Press. Gas (Liq.) ; H280, Contains gas under pressure; may explode if heated.

2.2. Label elements

Hazard pictogram(s):

Signal word: Danger

Hazard statement(s): Flammable gas (H221)
Contains gas under pressure; may explode if heated. (H280)

Precautionary statement(s):

General: Not applicable.

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

Response: Leaking gas fire: Do not extinguish, unless leak can be stopped safely. (P377)
In case of leakage, eliminate all ignition sources. (P381)

Storage: Store in a well-ventilated place. (P403)

Disposal: Not applicable.

Hazardous substances: Difluoromethane HFC-32
2,3,3,3-Tetrafluoroprop-1-ene

Additional labelling: Not applicable.

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
Difluoromethane HFC-32	CAS No.: 75-10-5 EC No.: 200-839-4 UK-REACH:	68.9%	Flam. Gas 1B, H221 Press. Gas (Liq.) , H280	

	Index No.:			
2,3,3,3-Tetrafluoroprop-1-ene	CAS No.: 754-12-1 EC No.: 468-710-7 UK-REACH: Index No.:	31.1%	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

-

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: 2YE

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.
Must be stored in a cool and well-ventilated area, away from possible sources of ignition.
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:	Keep only in original packaging.
Storage conditions:	Dry, cool and well ventilated < 50°C
Incompatible materials:	Strong acids Strong oxidizing agents

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

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

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

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

PNEC

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

8.2. Exposure controls

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

General recommendations: Observe general occupational hygiene standards.

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:
No specific requirements.

Skin protection:

Recommended	**Type/Category**	**Standards**	
Dedicated work clothing should be worn.	-	-	

Hand protection:

Material	Glove thickness (mm)	Breakthrough time (min.)	Standards	
Gloves	-	-	EN374	

Eye protection:

Type	Standards	
Face shield alternatively safety glasses with side shields.	EN166	

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Physical state:	Gas Liquefied Gas
Colour:	Colourless
Odour / Odour threshold:	Characteristic
pH:	Not applicable - product is a gas
Density (g/cm^3):	Does not apply to gases.
Relative density:	2.2
Kinematic viscosity:	No data available
Particle characteristics:	Not applicable - product is a gas

Phase changes

Melting point/Freezing point (°C):	Not applicable - product is a gas
Softening point/range (°C):	Does not apply to gases.
Boiling point (°C):	-50.9
Vapour pressure:	15.856 bar (25 °C)
Relative vapour density:	No data available
Decomposition temperature (°C):	Not applicable - product is a gas

Data on fire and explosion hazards

Flash point (°C):	Not applicable - product is a gas
Flammability (°C):	The material is ignitable.
Auto-ignition temperature (°C):	496
Lower and upper explosion limit (% v/v):	11.25 - 22

Solubility

Solubility in water:	Not applicable - product is a gas

n-octanol/water coefficient (LogKow):	Not applicable - product is a gas
Solubility in fat (g/L):	Not applicable - product is a gas

9.2. Other information

Evaporation rate (n-butylacetate = 100):	Fast
Oxidizing properties:	Not applicable
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
Extremes of temperature

10.5. Incompatible materials
Strong acids
Strong oxidizing agents

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	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

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

Serious eye damage/irritation

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

Respiratory sensitisation

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

Skin sensitisation

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

Germ cell mutagenicity

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

Carcinogenicity

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

Reproductive toxicity

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

STOT-single exposure

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

STOT-repeated exposure

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

Aspiration hazard

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

11.2. Information on other hazards

Long term effects

None known.

Endocrine disrupting properties

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	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

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

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	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 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

None known.

Contains fluorinated greenhouse gases covered by the Kyoto Protocol.

SECTION 13: DISPOSAL CONSIDERATIONS

Waste treatment methods

Product is covered by the regulations on hazardous waste. (*)
HP 3 - Flammable
Regulation (EU) No 1357/2014 of 18 December 2014 on waste as retained and amended in UK law.

EWC code

14 06 01* Chlorofluorocarbons, HCFC, HFC

Specific labelling

Contaminated packing

Return to 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	UN3161	LIQUEFIED GAS, FLAMMABLE, N.O.S. (Difluoromethane HFC-32, 2,3,3,3-Tetrafluoroprop-1-ene)	Transport hazard class: 2 Label: 2.1 Classification code: 2F 	-	No	Limited quantities: 0 Tunnel restriction code: (B/D) See below for additional information.
IMDG	UN3161	LIQUEFIED GAS, FLAMMABLE, N.O.S. (Difluoromethane HFC-32, 2,3,3,3-Tetrafluoroprop-1-ene)	Transport hazard class: 2 Label: 2.1 Classification code: 2F 	-	No	Limited quantities: 0 EmS: F-D S-U See below for additional information.
IATA	UN3161	LIQUEFIED GAS, FLAMMABLE, N.O.S. (Difluoromethane HFC-32, 2,3,3,3-Tetrafluoroprop-1-ene)	Transport hazard class: 2 Label: 2.1 Classification code: 2F 	-	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: 2YE

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. People under the age of 18 shall not be exposed to this product.
Demands for specific education:	No specific requirements.
Control of Major Accident Hazards (COMAH) - Categories / dangerous substances:	Liquefied flammable gases - Qualifying quantity (lower-tier): 50 tonnes / (upper-tier): 200 tonnes
UK-REACH, Annex XVII:	Difluoromethane HFC-32 is subject to UK-REACH restrictions (entry 40). 2,3,3,3-Tetrafluoroprop-1-ene is subject to UK-REACH restrictions (entry 40).
Additional information:	Not applicable.
Sources:	Control of Major Accident Hazards (COMAH) Regulations 2015. Regulation (EU) No 1357/2014 of 18 December 2014 on waste as retained and amended in UK law. 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

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