SAFETY DATA SHEET
REFRIGERANT R410A

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

1.1. Product Identifier

Product name: REFRIGERANT R410A

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

Use: Refrigerant.
Advised Against: No specific uses advised again have been identified, other than restrictions in the F-Gas Regulations.

1.3. Details of the supplier of the safety data sheet

Company name:

National Refrigerants Ltd.
4 Watling Close
Sketchley Meadows Business Park
Hinckley LE10 3EZ
Tel: +44(0)1455 630790
Fax: +44(0) 1455 630791
Email: sds@nationalref.com

1.4. Emergency telephone number

Emergency Tel: +44(0) 1865 407333

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance of mixture

Classification under Directive 67/548/EEC or 1999/45/EC: This substance is not classified as dangerous according to Directive 67/548/EEC or 1999/45/EC.
Most important adverse effect: Rapid evaporation of the liquid may cause frostbite.
Vapour is heavier than air and can cause suffocation.

2.2. Label elements

Directives 67/458/EEC or 1999/45/EC: This substance is not classified as dangerous according to Directive 67/548/EEC or 1999/45/EC.
Special labelling of certain mixtures: Contains fluorinated greenhouse gases covered by the Kyoto Protocol

2.3. Other hazards

SECTION 3: COMPOSITION / INFORMATION ON INGREDIENTS

3.1. Substances

Hazardous Ingredients:

3.2 Mixtures

DIFLUOROMETHANE (R32)

EINECS	CAS	67/548/EEC Classification	CLP Classification	Percent

200-839-4	75-10-5	F+; R12	H220: Flammable gas H280: Pressurised gas	48.5 – 50.5%

PENTAFLUOROETHANE (R125)

EINECS	CAS	67/548/EEC Classification	CLP Classification	Percent
206-557-8	354-33-6		H280: Pressurised gas	49.5 – 51.5%

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

Skin contact: Take off all contaminated clothing immediately if not stuck to the skin. Flush area with lukewarm water. Do not use hot water. If frostbite has occurred call a physician.

Eye contact: Hold eyelids apart and flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Ingestion: This is not considered a potential route of exposure.

Inhalation: Remove from exposure, lie down. Move to fresh air. Keep patient warm and at rest. Artificial respiration and/or oxygen may be necessary. Consult a physician.

General Advice Never give anything by mouth to an unconscious person. When symptome persist or in all cases of doubt seek medical advice.

4. 2. Most important symptoms and effects, both acute and delayed

Skin contact: Low exposure will cause redness and pain. High exposure will cause frostbite, blisters and severe pain.

Eye contact: Cause severe pain and cornea damage.

Ingestion: Not a route of exposure.

Inhalation: Shortness of breath, severe headache, dizziness, nausea, weakness, and unconsciousness. Irregular cardiac activity.

Treatment: Do not give adrenaline or similar drugs.

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

Immediate/special treatment: Burns pack should be available on the premises.

SECTION 5: FIRE-FIGHTING MEASURES

5.1. Extinguishing media

Extinguishing media: Water spray, Foam, Dry chemical Carbon dioxide (CO_2). Use extinguishing measures that are appropriate to local and surrounding environment. Cool cylinders/tanks with water spray.

5.2. Special hazards arising from the substance or mixture

Special hazards arising from the mixture Vapours may form explosive mixtures with air. Vapours are heavier than air and may spread along floors. Vapours or gases may travel considerable distances to ignition source and flash back. Fire or intense heat may cause violent rupture of packages.
Hazardous thermal decomposition products: carbon oxides, hydrogen fluoride, carbonyl fluoride.

5.3. Advice for fire-fighters

Advice for fire-fighters: In the event of fire wear self-contained breathing apparatus.
Use personal protective equipment.
Wear neoprene gloves during cleaning work after a fire.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Personal precautions: Evacuate personnel to safe areas. Ventilate the area, especially low or enclosed places where heavy vapours might collect.

6.2. Environmental precautions

Environmental precautions: Should not be released into the atmosphere.

6.3. Methods and material for containment and cleaning up

Clean-up procedures: Material evaporates.

6.4. Reference to other sections

Reference to other sections: Refer to Section 7 of SDS. Refer to Section 8 of SDS.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Handling requirements: *Advice on handling:* Avoid breathing vapours or mist. Avoid liquid contact with skin and clothing. Provide sufficient air exchange and/or exhaust in work rooms.
Advice on protection against fire and explosion: No special measures against fire required.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions: Do not drag, slide or roll cylinders. Never attempt to lift cylinder by its cap. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder. Keep at temperature not exceeding 52°C. Keep cylinders tightly closed in a dry, cool and well-ventilated place.

Suitable packaging: Store in original cylinder only.
Protect from contamination.

Storage temperature: Less than 52°C

7.3. Specific end use(s)

Specific end use(s) No data available.

SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

If subsection is empty then no values are applicable

8.1. Control parameters

Hazardous ingredients:
PENTAFLUOROETHAN (HFC125)
Workplace exposure limits

State	8 hour TWA	15 min. STEL
UK	1000 ppm (4900 mg/m^3)	-

8.2. Derived No Effect Level

Difluoromethane Type of Application (Use): Workers
Exposure routes: Inhalation

	Health effects: Chronic effects, Systemic toxicity Value: 7035 mg/m^3 Type of application (Use); Consumers Exposure routes: Inhalation Health effects: Chronic effects, Systemic toxicity Value: 750 mg/m^3
Pentafluoroethane	Type of Application (Use): Workers Exposure routes: Inhalation Health effects: Chronic effects, Systemic toxicity Value: 16444 mg/m^3 Type of application (Use): Consumers Exposure routes: Inhalation Health effects: Chronic effect, Systemic toxicity Value; 1753 mg/m^3

8.3 Predicted No Effect Concentration

Difluoromethane	Value: 0.142 mg/l Compartment: Fresh water Value: 1.42 mg/l Compartment: Water Remarks; Intermittent use/release Value: 0.534 mg/l Compartment: Fresh water sediment
Pentafluoroethane	Value; 0.1 mg/l Compartment: Fresh water Value: 1 mg/l Compartment: Water Remarks; Intermittent use/release Value: 0.6 mg/l Compartment: Fresh water sediment

8.4 Exposure controls

Engineering measures:	Ensure adequate ventilation, especially in confined areas. Local exhaust should be used when large amounts are released.
Respiratory protection:	For rescue and maintenance work in storage tanks use self-contained breathing apparatus. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.
Hand protection:	Heat insulating gloves
Eye protection:	Safety glasses with side shields. Wear a face shield in addition where the possibility exists for face contact due to splashing, spraying or airborne contact with this material.
Skin protection:	Wear impervious clothing that covers legs and arms.
Protective measures	When using do not smoke
Hygiene measures	Handle in accordance with good industrial hygiene and safety practice.
Environmental:	Gas escapes to be kept to the minimum by engineering processes and operating methods.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

State:	Liquefied gas under pressure.
Colour:	Clear colourless liquid and vapour.
Odour:	Ethereal
Molecular weight:	72.59 g/mole

Boiling Point/range:	- 51.2 to -51.1°C (boiling range)
Flash Point:	Does not flash. Non-flammable
Vapour pressure:	14.706 Bar (14706 hPa) at 20°C
Liquid Density:	1081 kg/m^3 at 20°C

SECTION 10. STABILITY AND REACTIVITY

10.1. Reactivity

Reactivity: Stable under recommended storage and transport conditions.

10.2. Chemical stability

Chemical stability: Stable under normal conditions.

10.3. Possibility of hazardous reactions

Hazardous reactions: Hazardous reactions will not occure under recommended storage and transport conditions.
May react with aluminium.

10.4. Conditions to avoid

Conditions to avoid: Heat, hot surfaces, flames.
The product is not flammable in air under ambient conditiond of temperature and pressure. When pressurised with air or oxygen, the mixture may become flammable or reactive under certain conditions.

10.5. Incompatible material

Materials to avoid: Alkali metals, alkaline earth metals, powdered metals, powdered metal salts.

10.6. Hazardous decomposition products

Hazardous decomposition products Thermal decomposition yields toxic products which can be corrosive in the presence of moisture.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Acute oral toxicity

Difluoromethane	Not applicable
Pentafluoroethane	Not applicable

Acute inhalation toxicity

Inhalation

Difluoromethane:	LC50/rat: > 520 000 ppm /dog: Not a cardiac sensitizer.
Pentafluoroethane:	LC50/rat: > 800 000 ppm /dog: Cardiac sensitization.

Acute dermal toxicity

Difluoromethane;	Not applicable
Pentafluoroethane:	Not applicable

Skin irritation

Difluoromethane:	Not tested on animals. Classification: Not classified as irritant. Result: No skin irritation. Not expected to cause skin irritation based on expert review of the properties of the substance.
Pentafluoroethane:	Not tested on animals.

Classification: Not classified as irritant
Result: No skin irritation.
Not expected to cause skin irritation bases on expert review of the properties of the substance.

Eye irritation

Difluoromethane:
Not tested on animals.
Classification: Not classified as irritant
Result: No eye irritation.
Not expected to cause eye irritation bases on expert review of the properties of the substance.

Pentafluoroethane:
Not tested on animals.
Classification: Not classified as irritant
Result: No eye irritation.
Not expected to cause eye irritation bases on expert review of the properties of the substance.

Sensitisation

Difluoromethane:
Not tested on animals.
Classification: Not a skin irritant
Result: Does not cause skin sensitisation.
Not expected to cause skin sensitisation bases on expert review of the properties of the substance.

There are reports of human respiratory sensitisation.

Pentafluoroethane:
Not tested on animals.
Classification: Not a skin irritant
Result: Does not cause skin sensitisation.
Not expected to cause skin sensitisation bases on expert review of the properties of the substance.

Repeated dose toxicity

Difluoromethane:
Inhalation rat
No toxicologically significant effects were found,

Pentafluoroethane:
Inhalation rat
No toxicologically significant effects were found,

Mutagenic assessment

Difluoromethane:
Animal testing did not show any mutagenic effects.
Tests on bacteria or mammalian cell cultures did not show mutagenic effects.

Pentafluoroethane:
Animal testing did not show any mutagenic effects.
Tests on bacteria or mammalian cell cultures did not show mutagenic effects.

Carcinogenicity Assessment

Difluoromethane: Not classifiable as a human carcinogen.
Pentafluoroethane: Not classifiable as a human carcinogen.

Toxicity to reproduction assessment

Difluoromethane: No toxicity to reproduction.
Pentafluoroethane: No toxicity to reproduction.

Human experience

Excessive exposures may affect human health as follows:
Inhalation: Sever shortness of breath, narcosis, irregular cardiac activity.

Futher information

Rapid evaporation of the liquid may cause frostbite. May cause cardiac arrhythmia.

SECTION 12. ECOLOGICAL INFORMATION

12.1. Toxicity

Toxicity to fish:

Difluoromethane: LC50/96 h/Fish: 1507 mg/l

Pentafluoroethane: LC_{50}/96 h/Oncorhynchus (rainbow trout): > 81.2 mg/l
Information given is based on data obtained from similar substances.

LC_{50}/96 h/Danio rerio (zebra fish): > 200 mg/l
Information given is based on data obtained from similar substances.

LC_{50}/96 h/Oncorhynchus mykiss (rainbow trout): 450 mg/l
Information given is based on data obtained from similar substances.

Toxicity to Aquatic plants:

Difluoromethane: LC_{50}/96 h/Algae: 142 mg/l

Pentafluoroethane: LC_{50}/72 h/Pseudokirchneriella subcapitata (green algae): >118 mg/l
Information given is based on data obtained from similar substances.

LC_{50}/72 h/Pseudokirchneriella subcapitata (green algae): >114 mg/l
Information given is based on data obtained from similar substances.

LC_{50}/96 h/Algae: 142 mg/l
Information given is based on data obtained from similar substances.

Toxicity to aquatic invertebrates

Difluoromethane EC_{50}/48 h/Daphnia: 652 mg/l

Pentafluoroethane EC_{50}/48 h/Daphnia magna (Water flea): > 200 mg/l
Information given is based on data obtained from similar substances.

EC_{50}/48 h/Daphnia magna (Water flea): > 97.9 mg/l
Information given is based on data obtained from similar substances.

EC_{50}/48 h/Daphnia magna (Water flea): > 97.9 mg/l
Information given is based on data obtained from similar substances.

Ecotoxic values: When discharged may contribute to the greenhouse effect.

Global Warming Potential (GWP) 0 (CO^2 = 1)

Ozone Depletion Potential (ODP) 1980 (R11 = 1)

12.2. Persistence and degradability

Persistence and degradability: No data available.

12.3. Bio accumulative potential

Bio-accumulative potential: No data available.

12.4. Mobility in soil

Mobility: No data available.

12.5. Results of PBT and vPvB assessment

PBT identification: No data available

12.6. Other adverse effects

Other adverse effects:

SECTION 13. DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Disposal operations: Do not allow product to be released into the environment.
Recovery Operations: Consult the manufacturer or supplier for information regarding recovery and recycling of the product. If recovery is not possible, incinerate at a licensed installation.
Disposal of packaging: De-gas and return cylinders to suppliers.
N.B. The user's attention is drawn to the possible existence of regional or national regulations regarding disposal.

SECTION 14. TRANSPORT INFORMATION

14.1. ADR

UN Number: 3163
Class: 2
Classification code: 2A
Hazard Identification Number: 20
Labelling Number: 2.2
Proper Shipping Name: Liquefied Gas N.O.S. (Difluoromethane, Pentafluoroethane)
Tunnel code: (C/E)

14.2. IATA_C

UN Number: 3163
Class: 2
Labelling Number: 2.2
Proper Shipping Name: Liquefied Gas N.O.S. (Difluoromethane, Pentafluoroethane)

14.3. IMDG

UN Number: 3163
Class: 2
Labelling Number: 2.2
EmS: F-C, S-V
Proper Shipping Name: Liquefied Gas N.O.S. (Difluoromethane, Pentafluoroethane)
Marine Pollutant: No

SECTION 15. REGULATORY INFORMATION

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

Special labelling of certain mixtures: Contains fluorinated greenhouse gases covered by the Kyoto Protocol.

15.2. Chemial Safety Assessment

Chemical safety assessment: A chemical safety assessment has not been carried out by the supplier of this mixture.

16. OTHER INFORMATION

Other information: This safety sheet is prepared in accordance with Commission Regulation (EU) No. 453/2010.
* Indicates text in SDS which has changed since the last revision
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Text of R-phrases mentioned in Section 3: R12 Extremely flammable

Full text of H-statements referred under Section 3:
H220 Extremely flammable gas
H280 Contains gas under pressure; may explode if heated.

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GENERAL SAFETY & HANDLING DATA

1. GENERAL

Only trained persons should handle compressed gases.
Observe all regulations and local requirements regarding the storage of Cylinders.
Do not remove or deface labels provided by the supplier for the identification of the Cylinder contents.
Ascertain the identity of the gas before using it.
Know and understand the properties and hazards associated with each gas before using it.
When doubt exists as to the correct handling procedure for a particular gas contact the supplier.

HANDLING AND USE

Wear stout gloves.
Never lift a Cylinder by the cap or guard unless the supplier states it is designed for that purpose.
Use trolley or other suitable device or technique for transporting heavy Cylinders, even for a short distance.
Where necessary wear suitable eye and face protection. The choice between safety glasses, chemical goggles, or full face shield will depend on the pressure and nature of the gas being used,

Where necessary for toxic gases see that self-contained positive pressure breathing apparatus or full face airline respirator is available in the vicinity of the working area.
Employ suitable pressure regulating device on all Cylinders when gas is being emitted to systems with lower pressure rating than that of the Cylinder.
Ascertain that all electrical systems in the area are suitable for service with each gas.

Never use direct flame or electrical heating devices to raise the pressure of a Cylinder, Cylinders should not be subjected to temperatures above 45^{o}C.
Never re-compress a gas mixture without consulting the supplier. Never attempt to transfer gases from one Cylinder to another.
Do not use Cylinders as rollers or supports, or for any other purpose other than to contain the gas as supplied.
Never permit oil, grease or other readily combustible substances to come into contact with valves of Cylinders containing oxygen or other oxidants.
Keep Cylinder valves clean and free from contaminants particularly oil and water.

Do not subject Cylinders to mechanical shocks which may cause damage to their valves or safety devices.

Never attempt to repair or modify Cylinder valves or safety relief devices. Damaged valves should be reported immediately to the supplier.
Close the Cylinder valve whenever gas is not required even if the Cylinder is still connected to the equipment.

2. STORAGE

Cylinders should be stored in a well-ventilated area.
Some gases will require a purpose built area.
Store Cylinders in a location free from fire risk and away from sources of heat and ignition. Designate as a no smoking area.

Gas Cylinders should be segregated in the storage according to the various categories.

The storage area should be kept clear and access should be restricted to authorized persons only, the area should be clearly marked as a storage area and appropriate hazard warning signs displayed (Flammable, Toxic etc.).
The amount of flammable or toxic gases should be kept to a minimum.
Flammable gases should be stored away from other combustible materials.

Cylinders held in storage should be periodically checked for general condition and leakage.

Cylinders in storage should be properly secured to prevent toppling or rolling.
Vertical storage is recommended where the Cylinder is designed for this.
Cylinder valves should be tightly closed and, where appropriate, valves should be capped or plugged.
Protect Cylinders stored in the open against rusting and extremes of weather.
Cylinders should not be stored in conditions likely to encourage corrosion.
Store full and empty Cylinders separately and arrange full Cylinders so that the oldest stock is used first.

FOR FURTHER INFORMATION CONTACT YOUR NEAREST DISTRIBUTION CENTRE