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1st March 2025

PRODUCT SAFETY DATA SHEET

Product Name **RS-53 (R470A)**

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

| Product Identifier | REACH Registration No | CAS No | EC No |
|---|--------------------------|------------|-----------|
| Pentafluoroethane (HFC125) | 01-2119485636-25 | 354-33-6 | 206-557-8 |
| Difluoromethane (HFC 32) | 01-2119471312-47 | 75-10-5 | 200-839-4 |
| 1,1,1,2,3,3,3 Heptafluoropropane (HFC 227) | 01-2119485489-18 | 431-89-0 | 207-079-2 |
| Trans-1,3,3,3Tetrafluoroprop-1-ene (HFO 1234ze) | 01-0000019758-54 | 29118-24-9 | 471-480-0 |
| 1,1,1,2 Tetrafluoroethane (HFC 134a) | 01-2119459374-33 | 811-97-2 | 212-377-0 |
| Carbon Dioxide | Not Applicable | 124-38-9 | 204-696-9 |

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Use Subject to Member State regulations, applicable uses are: refrigerant, blowing agent, propellant, solvent

SECTION 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.

EU Classification Not classified as hazardous according to Directive EC 1272/2008

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Label Elements

Labelling according to Regulation (EC) 1272/2008 [CLP]



WARNING

Hazard Statement(s)

CLP H281 – Contains Refrigerated gases, may cause cryogenic burns or injury.

Precautionary Statement(s)

CLP P282 – Wear cold insulating gloves/ Face shield/ Eye protection

CLP P336 – Thaw frosted parts in lukewarm water. Do not rub affected area.

CLP P315 – Get immediate medical advice/attention.

CLP P403 – Store in a well ventilated place.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

| Hazardous Ingredient(s) | %w/w | CAS No | EC No | EU Classification |
|------------------------------------|------|------------|-----------|-----------------------|
| Pentafluoroethane | 19 | 354-33-6 | 206-557-8 | GHS04; H280 |
| Difluoromethane | 17 | 75-10-5 | 200-839-4 | GHS02, 04; H220, H280 |
| 1,1,1,2,3,3,3Heptafluoropropane | 3 | 431-89-0 | 207-079-2 | GHS04; H280 |
| Trans-1,3,3,3Tetrafluoroprop-1-ene | 44 | 29118-24-9 | 471-480-0 | H280, H220 |
| 1,1,1,2 Tetrafluoroethane | 7 | 811-97-2 | 212-377-0 | GHS04; H280 |
| Carbon Dioxide | 10 | 124-38-9 | 204-696-9 | H280 |

SECTION 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.

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| Eyes: | If substance has got into the eyes immediately wash out with plenty of water for at least 15 minutes. Keep eye wide open while rinsing. |
| Skin: | May cause frostbite. Wash frost-bitten area immediately with plenty of water. Do not remove clothing. Wash affected skin with warm water. If skin irritation persists, call a physician. |
| Inhalation: | Move to fresh air in case of accidental inhalation of vapours. Oxygen or artificial respiration if needed. Do not apply artificial respiration if patient is breathing. Consult a physician after significant exposure. Do not give adrenaline or similar drugs. |
| Ingestion: | Do not induce vomiting without medical advice. Call a physician immediately. Do not give drugs from adrenaline-ephedrine group. |
| General advice: | Consult a physician for severe cases. |

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SECTION 5. FIRE-FIGHTING MEASURES

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| General | <p>This refrigerant is none flammable in air under ambient conditions of temperature and pressure. Certain mixtures of this refrigerant and air when under pressure may be flammable. Mixtures of this refrigerant and air under pressure should be avoided.</p> <p>Certain mixtures of HFC's and Chlorine may be flammable or reactive under certain conditions. Thermal decomposition will evolve very toxic and corrosive vapours (Hydrogen Fluoride).</p> <p>Containers may rupture violently if overheated.</p> |
| Extinguishing Media | <p>As appropriate for the surrounding fire.</p> <p>Keep containers exposed to fire cool, by spraying them with water.</p> |
| Protective Equipment | <p>A self-contained breathing apparatus and full protective clothing must be worn in fire conditions. See also section 8.</p> |

SECTION 6. ACCIDENTAL RELEASE MEASURES

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| Personal Protection | <p>Ensure suitable personal protection (including respiratory protection) during removal of spillages. See also section 8.</p> |
| General | <p>Provided it is safe to do so, isolate the source of the leak. Allow small spillages to evaporate, provided there is adequate ventilation. For large spillages, ventilate the area. Contain the spillages with sand, soil or any suitable absorbent material. Prevent liquid from entering drains, sewers, basements and work pits, as the vapour may create a suffocating atmosphere.</p> |

SECTION 7. HANDLING AND STORAGE

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| Handling | <p>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.</p> <p>The vapour is heavier than air, high concentrations may be produced at low levels where generally ventilation is poor, in such cases provide additional ventilation or wear suitable positive air supply respiratory protective equipment.</p> <p>Avoid contact with naked flames and hot surfaces as corrosive and very toxic decomposition products can be formed.</p> <p>Avoid contact between the liquid, skin and eyes.</p> <p>For correct refrigerant composition, systems should be charged using the liquid phase and not the vapour phase.</p> <p>Avoid venting to atmosphere.</p> <p>The fluorinated greenhouse gas RS-53 (R470A) maybe supplied in returnable containers (cylinders or drums). The container contains fluorinated greenhouse gases covered by the Kyoto protocol. The fluorinated greenhouse gases in the containers may not be vented to atmosphere. Regulation (EC) No. 842/2006 of the European Parliament and the council on certain fluorinated greenhouse gases.</p> |
| Process Hazards | <p>Liquid refrigerant transfers between refrigerant containers and systems can result in static generation. Ensure adequate earthing. Certain mixtures of HFC's and Chlorine maybe flammable or reactive under certain conditions. Care must be taken to mitigate the risk of developing high pressures in equipment caused by a temperature rise when liquid is trapped in a confined space, between two closed valves for instance.</p> |

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Storage Keep in a well ventilated place away from fire risk and avoid sources of heat such as electric or steam radiators.
Avoid storing near the intake of air conditioning units, boiler units and open drains.

Specific use Subject to Member State regulations, applicable uses are: refrigerant, blowing agent, propellant, solvent

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

General Wear suitable protective clothing, gloves and eye/face protection. Wear thermal insulating gloves when handling liquefied gases.
In cases of insufficient ventilation, where exposure to high concentrations of vapour is possible, suitable respiratory protective equipment, with a positive pressure air supply should be used.



Wear Eye protection to EN166



Wear gloves to EN511

Occupational Exposure Limits

| Occupational Exposure Limits | CAS No | LTEL 8hr TWA ppm | LTEL 8hr TWA mg/m3 | STEL (ppm) 15 min Average | STEL mg/m3 15 min average | Source |
|------------------------------------|------------|---------------------------|-----------------------------|------------------------------------|------------------------------------|--------|
| Pentafluoroethane | 354-33-6 | 500 | 2500 | 750 | 3750 | GESTIS |
| Difluoromethane | 75-10-5 | 1000 | 2200 | - | - | Com |
| 1,1,1,2,3,3,3,heptafluoropropane | 431-89-0 | 1000 | - | - | - | Com |
| Trans-1,3,3,3Tetrafluoroprop-1-ene | 29118-24-9 | 800 | - | - | - | Com |
| 1,1,1,2 Tetrafluoroethane | 811-97-2 | 1000 | 4240 | - | - | GESTIS |
| Carbon Dioxide | 124-38-9 | 5000 | 9150 | 15000 | 27400 | Com |

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Form Liquefied Gas
 Colour Colourless
 Odour Slight Ethereal
 Solubility (water) Insoluble
 Solubility (other) Soluble in: alcohols, chlorinated solvents, esters
 Boiling Point -62.5 °C
 Vapour Pressure 266.9 psia at 25°C
 Liquid Density 1088 kg/m³ at 25°C
 Critical Temperature 88.7°C
 Critical Pressure 810.9 psia
 Flammability Non Flammable
 Flash Point Not applicable
 Auto-ignition temperature Not determined

SECTION 10. STABILITY AND REACTIVITY

Hazardous Reactions Certain mixtures of HFC's and chlorine maybe 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 and barium.

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Hazardous
Decomposition Products Hydrogen Fluoride by thermal decomposition and hydrolysis.

SECTION 11. TOXICOLOGICAL INFORMATION

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| Inhalation | High exposures may cause an abnormal heart rhythm and prove suddenly fatal. Very high atmospheric concentrations may cause anaesthetic effects and asphyxiation. |
| Skin Contact | Liquid splashes and spray may cause freeze burns. Unlikely to be hazardous by skin absorption. |
| Eye Contact | Liquid splashes and spray may cause freeze burns. |
| Ingestion | Highly unlikely – but should this occur freeze burns will result. |
| Long Term Exposure | HFC 125: LC 50 inhalation (Rat)/4hrs: > 769,000 ppm HFC 32: LC 50 inhalation (Rat)/4hrs: > 520,000 ppm HFC 227ea: LC 50 inhalation (Rat)/4hrs: > 800,000 ppm HFO-1234ze(E) LC 50 inhalation (Rat)/4hrs: > 207,000 ppm HFC 134a: LC 50 inhalation (Rat)/4hrs: > 350,000 ppm CO ₂ No data available |

SECTION 12. ECOLOGICAL INFORMATION

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|-------------------------------------|---|
| Environmental fate and distribution | High tonnage material produced in wholly contained systems. High tonnage material used in open systems. Vapour. |
| Persistence and Degradation | HFC 227ea: Decomposed slowly in the lower atmosphere (troposphere). Atmospheric lifetime is 34.2 years. HFC 125: Decomposed less slowly in the lower atmosphere (troposphere). Atmospheric lifetime is 29 years. HFC 134a: Decomposed comparatively rapidly in the lower atmosphere (troposphere). Atmospheric lifetime is 14 years. HFC 32: Decomposed rapidly in the lower atmosphere (troposphere). Atmospheric lifetime is 4.9 years HFO-1234ze(E): Has an atmospheric lifetime of approximately 0.05 years. CO ₂ : No data available. RS-53 (R470A): 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 977 (relative to 1 of carbon dioxide at 100 years) according to Annex 1 of regulation 842/2006 on certain fluorinated greenhouse gases. Values in Annex 1 are taken from the Fifth assessment report (AR5) of the Intergovernmental Panel on Climate Change (2001 IPCC GWP values). United Nations Framework Convention on Climate Change (UNFCCC) reporting GWP is 909. |
| Effect on Effluent Treatment | Discharges of the product will enter the atmosphere and will not result in long term aqueous contamination. |
| PBT and vPvB | This mixture does not contain any substances that are assessed to be a PBT or a vPvB. |

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SECTION 13. DISPOSAL CONSIDERATIONS

Recommended It is best to recover and recycle, Refrigerant Solutions Limited will take back product for reclamation provided RS-53 (R470A) has not been mixed with other products. If this is not possible, destruction is to be in an approved facility which is equipped to absorb and neutralise acidic gases and other toxic processing products.

SECTION 14. TRANSPORT INFORMATION

UN number 1078

UN proper shipping name Refrigerant Gas RS-53 (R470A)

Transport hazard class(es) 2.2

Packing group 2

Environmental Hazards The container contains fluorinated greenhouse gases covered by the Kyoto Protocol and may not be vented to atmosphere.

Special precautions for user Liquid splashes or spray may cause freeze burns to skin and eyes.

Transport in bulk It is not intended that this product will be transported in bulk according to Annex II of MARPOL73/78

SECTION 15. REGULATORY INFORMATION

European Regulations Not classified as hazardous according to Directive EC 1272/2008

Special restrictions: The fluorinated greenhouse gas RS-53 (R470A) 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 atmosphere.

 Regulation (EC) No. 842/2006 of the European Parliament and the Council on certain fluorinated gases.

 Directive 2006/40/EC of the European Parliament and the Council relating to emissions from the air-conditioning systems in motor vehicle vehicles and amending Council Directive 70/156/EEC.

R-phrases(s): No R-phrases

S-phrases(s): S7/9 – Keep container tightly closed in a well-ventilated place
S24/25 – Avoid contact with skin and eyes
S47 – Keep at temperature not exceeding 50°C
S51 – Use only in well ventilated areas
S61 – Avoid release to the environment.

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16. OTHER INFORMATION

Glossary

| | |
|---------|---|
| GESTIS: | GESTIS International Limit values Database |
| PBT | Persistent, Bioaccumulative and Toxic substance |
| vPvT | Very Persistent and Very Bioaccumulative |
| REACH | Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (EC) No 1907/2006 |
| LC50 | Lethal Concentration to 50 % of a test population |
| CLP | Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008 |
| CAS# | Chemical Abstracts Service number |
| LTEL | Long Term Exposure Limit |
| STEL | Short Term Exposure Limit |
| EU | European Union |
| COM | The Company aims to control exposure in its workplace to this limit |

The information provided in this Product Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process unless specified in the text.