

# R-407F

## Safety Data Sheet

### R-407F

#### 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

**PRODUCT NAME:** R-407F  
**OTHER NAME:** Difluoromethane, Pentafluoroethane, 1,1,1,2-Tetrafluoroethane  
**USE:** Refrigerant Gas  
**DISTRIBUTOR:** National Refrigerants, Inc.  
661 Kenyon Avenue  
Bridgeton, New Jersey 08302

#### 2. HAZARDS IDENTIFICATION

<b>CLASSIFICATION:</b>	Gases under pressure, Liquefied Gas
<b>SIGNAL WORD:</b>	WARNING
<b>HAZARD STATEMENT:</b>	Contains gas under pressure, may explode if heated
<b>SYMBOL:</b>	Gas Cylinder
<b>PRECAUTIONARY STATEMENT:</b>	<b>STORAGE:</b> Protect from sunlight, store in a well ventilated place



#### EMERGENCY OVERVIEW:

**CAUTION!** This product is a clear, colorless, liquefied gas with a faint ether-like odor. Contents under pressure. Cylinders may rupture and rocket under fire conditions. Thermal decomposition can produce toxic and corrosive gases. Vapors are heavier than air. May cause asphyxia. Liquid splashes or spray may cause freeze burns (frostbite). High vapor concentrations may cause an abnormal heart rhythm and prove suddenly fatal. Very high atmospheric concentrations can cause anesthetic effects progressing from dizziness, weakness, nausea, to unconsciousness. It can act as an asphyxiant by limiting available oxygen. Read the entire MSDS for a more thorough evaluation of the hazards.

#### POTENTIAL HEALTH HAZARDS

**SKIN CONTACT:** Liquid splashes or spray may cause freeze burns.

**SKIN ABSORTION:** This product will probably not be absorbed through human skin.

**EYES:** Liquid splashes or spray may cause freeze burns.

**INHALATION:** Exposure to high vapor concentrations may cause an abnormal heart rhythm and prove suddenly fatal. Very high atmospheric concentration can cause anesthetic effects progressing from dizziness, weakness, nausea, to unconsciousness. It can act as an asphyxiant by limiting available oxygen.

**INGESTION:** Extremely unlikely to occur in use.

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**OTHER EFFECTS OF EXPOSURE:** None expected.

## 3. COMPOSITION / INFORMATION ON INGREDIENTS

<u>INGREDIENT NAME</u>	<u>CAS NUMBER</u>	<u>WEIGHT %</u>
Difluoromethane (HFC-32)	75-10-5	30
Pentafluoroethane (HFC-125)	354-33-6	30
1,1,1,2-Tetrafluoroethane (HFC-134a)	811-97-2	40

### COMMON NAME and SYNONYMS

R-407F; HFC-407A

There are no impurities or stabilizers that contribute to the classification of the material identified in Section 2

## 4. FIRST AID MEASURES

**SKIN:** Immediately wash with plenty of warm water (do not rub). Thaw affected area with water. Remove contaminated clothing. Caution: Clothing may adhere to the skin in case of freeze burns. If symptoms (irritation or blistering) develop, get medical attention.

**EYES:** Immediately flush with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Hold eyelids open during flushing. Have eyes examined and treated by medical personnel.

**INHALATION:** Move victim to fresh air. Keep warm and at rest. If breathing is labored, give oxygen. If only breathing has stopped, give artificial respiration with a pocket mask equipped with a one-way valve to prevent exposure to product or body fluids. If breathing has stopped and there is no pulse, give cardiopulmonary resuscitation (CPR). Get immediate medical attention.

**INGESTION:** Highly unlikely, but should this occur, freeze burns will result. Do not induce vomiting unless instructed to do so by a physician.

**NOTE TO PHYSICIAN:** Symptomatic and supportive therapy, as indicated. Administration of epinephrine or similar sympathomimetic drugs should be with special caution and only in situations of emergency life support as cardiac arrhythmias may result.

## 5. FIRE FIGHTING MEASURES

### FLAMMABLE PROPERTIES

<b>FLASH POINT:</b>	Not flammable (ASHRAE 34)
<b>AUTOIGNITION TEMPERATURE:</b>	Not available
<b>UPPER FLAME LIMIT (volume % in air):</b>	Not applicable
<b>LOWER FLAME LIMIT (volume % in air):</b>	Not applicable

### **HAZARDOUS REACTIONS:**

Reacts with finely divided metals such as aluminum, zinc, magnesium, and alloys containing more than 2% magnesium. Can react violently if in contact with alkali metals and alkaline earth metals such as sodium, potassium, or barium.

During a fire the product can form toxic and corrosive gases such as hydrogen fluoride.

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## **EXTINGUISHING MEDIA:**

As appropriate for surrounding materials/equipment.

## **FIRE AND EXPLOSION HAZARDS:**

Compressed liquefied gas. Containers may burst under intense heat. Ruptured cylinders may rocket or fragment. Heavy vapor may suffocate. R-407F is not flammable in air under ambient conditions or temperature and pressure. Certain mixtures of R-407F and air, when under pressure, may be flammable. Certain mixtures of R-407F and chlorine may be flammable or reactive under some conditions.

## **FIRE FIGHTING PROCEDURES:**

Water spray should be used to cool containers.

## **FIRE FIGHTING PROTECTIVE EQUIPMENT:**

Use self-contained breathing apparatus with a full face piece and special protective clothing.

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## **6. ACCIDENTAL RELEASE MEASURES**

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Contents under pressure. Ruptured cylinder may rocket or fragment. This product is a liquefied gas, which exits the container at temperatures capable of causing freeze burns (frostbite).

Precautions should take into account the severity of the leak or spill.

Move unprotected personnel upwind of leaking container. Remove ignition sources and ventilate the spill area. Use recommended personal protection and shut off the leak, if without risk. If possible, elevate leak position to highest point of container (should leak gas, not liquid). Water should never be put on leak nor should cylinder be immersed. If possible, dike and contain spillage. Prevent liquid from entering sewers, sumps, or pit areas since vapor is heavier than air and can create a suffocating atmosphere. Capture material for recycle or destruction if suitable equipment is available.

Notify applicable government authority if release is reportable or could adversely affect the environment.

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## **7. HANDLING AND STORAGE**

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### **HANDLING:**

Wear appropriate personal protective equipment. A safety shower and eyewash station should be nearby and ready to use.

This product is a liquefied gas, which exits the container at temperatures capable of causing freeze burns (frostbite). Ensure personnel are trained in handling and storing cylinders. Secure containers at all times. Keep containers closed when not in use.

Ensure there is adequate ventilation or use proper respiratory protection in poorly ventilated or confined areas. Avoid causing and inhaling high concentrations of vapor. Atmospheric levels should be controlled to below the occupational exposure limit and kept as low as practical.

Prevent liquid or vapor from entering sumps or sewers since vapor is heavier than air and may form suffocating atmospheres.

Do not put mixtures of R-407F with air or oxygen under pressure; do not use such mixtures for leak or pressure testing.

Avoid R-407F contact with flames or very hot surfaces. Do not heat containers.

Liquid transfers between containers may generate static electricity. Ensure adequate grounding.

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Avoid trapping liquid between closed valves or overfilling containers as high pressures can develop with an increase in temperature.

## STORAGE RECOMMENDATIONS:

Keep containers tightly closed, in a cool, well-ventilated place. Keep containers dry. Keep away from incompatibles, open flames, hot surfaces, welding operations, and other heat sources.

## STORAGE TEMPERATURE:

Store at temperature not exceeding 125 deg. F (52 deg. C)

## INCOMPATIBILITIES:

Freshly abraded aluminum surfaces at specific temperatures and pressures may cause a strong exothermic reaction. Chemically reactive metals: potassium, calcium, powdered aluminum, magnesium, and zinc.

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## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

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### EXPOSURE GUIDELINES

<u>INGREDIENT NAME</u>	<u>ACGIH TLV</u>	<u>OSHA PEL</u>	<u>OTHER LIMIT</u>
Difluoromethane	None	None	*1000 ppm TWA (8hr)
Pentafluoroethane	None	None	*1000 ppm TWA (8hr)
1,1,1,2-Tetrafluoroethane	None	None	*1000 ppm TWA (8hr)

\* = Workplace Environmental Exposure Level (AIHA)

No ACGIH TLV or OSHA PEL has been established for any of the components.

Minimize exposure in accordance with good hygiene practice.

### PREVENTIVE MEASURES

#### ENGINEERING CONTROLS:

Use ventilation to maintain safe levels. Where appropriate engineering controls are not in place or are inadequate, wear suitable respiratory equipment.

### PERSONAL PROTECTIVE EQUIPMENT

#### SKIN PROTECTION:

Take all precautions to prevent skin contact. Use gloves and protective clothing made of material that has been found by user to be impervious under conditions of use to prevent the skin from becoming frozen from contact with liquid. User should verify impermeability under normal conditions of use prior to general use. Additional protection such as an apron, arm covers, or full body suit may be needed depending on conditions of use.

#### EYE PROTECTION:

Use chemical safety goggles or safety glasses and a face shield when there is potential for eye contact.

#### RESPIRATORY PROTECTION:

Not normally needed if controls are adequate. If needed, use NIOSH/MSHA approved respirator for organic vapors. For high concentrations and oxygen deficient atmospheres, use positive pressure air-supplied respirator.

#### OTHER PROTECTION:

Shower and eyewash station.

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## 9. PHYSICAL AND CHEMICAL PROPERTIES

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<b>APPEARANCE:</b>	Colorless, liquefied gas
<b>SPECIFIC GRAVITY:</b>	1.17 @ 20°C
<b>SOLUBILITY IN WATER:</b>	Insoluble
<b>pH:</b>	Neutral
<b>BOILING POINT:</b>	-49.9° F to -38.0° F, -45.5° C to -38.9° C (boiling range)
<b>VAPOR PRESSURE (mmHg at 20° C.):</b>	8250
<b>VAPOR DENSITY (air = 1.0):</b>	2.54 at bubble point temperature
<b>% VOLATILE BY VOLUME:</b>	100
<b>ODOR THRESHHOLD:</b>	Not established
<b>FLAMMABILITY:</b>	Not applicable
<b>LEL/UEL:</b>	None/None
<b>RELATIVE DENSITY:</b>	1.14 g/cm <sup>3</sup> at 21.1°C
<b>PARTITION COEFF (n-octanol/water)</b>	Not applicable
<b>AUTO IGNITION TEMP:</b>	Not determined
<b>DECOMPOSITION TEMPERATURE:</b>	>250 °C
<b>ODOR:</b>	Faint ethereal odor
<b>FREEZING POINT:</b>	Not Determined
<b>VISCOSITY:</b>	Not applicable
<b>FLASH POINT:</b>	Not applicable

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## 10. STABILITY AND REACTIVITY

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### CHEMICAL STABILITY:

Stable under normal conditions.

### INCOMPATIBILITIES:

Reacts with finely divided metals such as aluminum, zinc, magnesium, and alloys containing more than 2% magnesium. Can react violently if in contact with alkali metals and alkaline earth metals such as sodium, potassium, or barium.

### HAZARDOUS DECOMPOSITION PRODUCTS:

Hydrogen fluoride by thermal decomposition and hydrolysis.

### HAZARDOUS POLYMERIZATION:

Will not occur.

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## 11. TOXICOLOGICAL INFORMATION

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### POSSIBLE HUMAN HEALTH EFFECTS:

#### ROUTES OF EXPOSURE:

Inhalation, ingestion, eye, and skin contact.

#### INHALATION:

Exposure to high vapor concentrations may cause an abnormal heart rhythm and prove suddenly fatal. Very high atmospheric concentrations can cause anesthetic effects progressing from dizziness, weakness, nausea, to unconsciousness. It can act as an asphyxiant by limiting available oxygen.

#### INGESTION:

Highly unlikely, but should this occur, freeze burns will result.

**EYE CONTACT:**

Liquid splashes or spray may cause freeze burns.

**SKIN CONTACT:**

Liquid splashes or spray may cause freeze burns.

**OTHER EFFECTS:**

None anticipated.

**CARCINOGENICITY:**

None of the ingredients are classified as carcinogenic by IARC, ACGIH, NTP, or OSHA.

**ANIMAL DATA:****Difluoromethane (HFC 32)**

LC 50 4hour, rat inhalation > 520,000 ppm

Because of its volatility this compound has not been tested for skin or eye irritancy or skin sensitization.

No cardiac sensitization (arrhythmias) occurred in dogs pretreated with epinephrine at 350,000 ppm. In an earlier cardiac sensitization study, a no observed effect level (NOEL) of 200,000 ppm and threshold of 250,000 ppm were established.

No teratogenic effects were seen in rats or rabbits at dose levels up to 50,000 ppm.

No adverse effects were seen at the highest dose level of 50,000 ppm in a 90- day inhalation study.

No genotoxicity was observed in a range of *in vitro* tests or an *in vivo* mouse micronucleus assay.

**Pentafluoroethane (HFC 125)**

The inhalation 4 hour LC50 in rats was greater than 800,000 ppm HFC 125.

Because of its volatility, this compound had not been tested for skin or eye irritancy, or skin sensitization.

The threshold for cardiac sensitization (arrhythmia) in dogs pretreated with epinephrine was an atmosphere of 75,000 ppm.

No developmental effects were seen in rabbits or rats following exposure during gestation or inhalation dose levels of 50,000 ppm.

HFC 125 showed no genetic toxicity in a range of *in vitro* tests or an *in vivo* mouse micronucleus assay.

No adverse effects were seen at the highest dose level of 50,000 ppm in a 90-day inhalation study in the rat.

**1,1,1,2-Tetrafluoroethane (HFC 134A)**

LC50 4hour inhalation, rat: >500,000 ppm

Slight eye irritation resulted from a brief spray of vapor.

HFC 134a was a slight skin irritant, but not a skin sensitizer.

The threshold for cardiac sensitization (arrhythmias) in dogs pretreated with epinephrine was an atmosphere of 75,000 ppm. The no observed effect level (NOEL ) was 50,000 ppm.

No effect of any kind was seen in a 90-day inhalation study in the rat at dose levels up to, and including 50,000 ppm (6 hours per day, 5 days per week).

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No developmental effects were seen in the rabbit following inhalation exposure to 40,000 ppm during gestation despite slight maternal toxicity. In a range-finding study in the rabbit, possible minimal embryo lethality was seen at a dose level of 50,000 ppm. In the rat, slight fetotoxicity was present at an inhalation dose of 50,000 ppm administered during gestation and no effects were seen at a dose of 10,000 ppm. In another study in the rat, no developmental effects were seen at a dose of 100,000 ppm in the presence of slight maternal toxicity; clear maternal effects were followed by embryo toxicity and fetotoxicity at a dose level of 300,000 ppm. There were no increases in the incidence of fetal malformations in rats or rabbits at doses up to and including 300,000 ppm and 50,000 ppm, respectively.

HFC-134a showed no genetic toxicity in a range of *in vitro* and *in vivo* tests. No adverse effects were found in a study in which rats were followed to week 104 after receiving 300 mg/kg bodyweight/day of HFC-134a by gavage for 52 weeks. In a 2-year inhalation study in rats, no adverse effects of any kind were observed except increased incidences of non-lift threatening, benign, microscopic testicular interstitial (Leydig) cell tumors and associated interstitial cell hyperplasia which were confined to the top dose of 50,000 ppm.

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## 12. ECOLOGICAL INFORMATION

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### **PERSISTENCE AND DEGRADATION:**

HFC 32 and HFC 134a decompose comparatively rapidly in the lower atmosphere (troposphere) while HFC 125 decomposes slowly in the lower atmosphere (troposphere). Estimated atmospheric lifetimes are 4.9, 29, and 14 years for HFC 32, HFC 125 and HFC 134a, respectively. Products of decomposition will be highly dispersed and hence have a very low concentration. Components are not significant contributors to photochemical smog and are not considered to be VOCs. None of the components are considered an ozone-depleting chemical.

**Octanol Water Partition Coefficient:** (See Section 9)

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## 13. DISPOSAL CONSIDERATIONS

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### **DISPOSAL METHOD:**

Discarded product is not a hazardous waste under RCRA, 40 CFR 261. However, R-407F should be recycled, reclaimed, or destroyed whenever possible.

### **EFFECT ON EFFLUENT TREATMENT:**

Discharges of the product will enter the atmosphere and will not result in long-term aqueous contamination.

### **REFRIGERATION APPLICATION:**

Subject to "no venting" regulations of Sections 608 and 609 of the Clean Air Act during the service or disposal of equipment.

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## 14. TRANSPORT INFORMATION

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<b>US DOT ID NUMBER:</b>	UN1078
<b>US DOT PROPER SHIPPING NAME:</b>	Refrigerant gases, n.o.s (Difluoromethane, Pentafluoroethane, 1,1,1,2-Tetrafluoroethane)
<b>US DOT HAZARD CLASS:</b>	2.2
<b>US DOT PACKING GROUP:</b>	Not applicable

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## 15. REGULATORY INFORMATION

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### **TOXIC SUBSTANCES CONTROL ACT (TSCA):**

**TSCA INVENTORY STATUS:** All ingredients are listed on the TSCA chemical substance inventory.

### **SARA / CERCLA REGULATIONS:**

40 CFR 372: This product does not contain any chemicals subject to reporting requirements of SARA Section 313.

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40 CFR 355: This product does not contain any “extremely hazardous chemical” subject to the requirements of SARA Section 312.

40 CFR 370: Hazardous properties as defined under the Hazard Communication Standard (29 CFR 1910.1200)

Health: Acute effects (CNS depression, cardiac sensitization).

Physical: Compressed liquefied gas.

(Actions may be necessary under SARA Section 311 – consult regulation for applicability).

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## 16. OTHER INFORMATION

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**CURRENT ISSUE DATE:** January, 2024

**PREVIOUS ISSUE DATE:** April, 2018

**OTHER INFORMATION:** HMIS Classification: Health – 1, Flammability – 1, Reactivity – 0  
NFPA Classification: Health – 2, Flammability – 1, Reactivity – 0  
ANSI / ASHRAE 34 Safety Group – A1

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