

Material Safety Data Sheet



R404 A

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : R404 A

Product Use Description : Refrigerant

Company : M/s.Refex Industries Ltd,
1/171,Old MahabalipuramRoad,
Thiruporur-603110,
Kanchipuram Dt.

Telephone No : 044-27445295

SECTION 2. HAZARDS IDENTIFICATION Emergency Overview

Form : Liquefied gas

Color : Colorless

Odor : weak

Hazard Summary : Warning! Container under pressure. This product is not flammable at ambient temperatures and atmospheric pressure. Gas reduces oxygen available for breathing. Causes asphyxiation in high concentrations. The victim will not realize that he/she is suffocating. Inhalation may cause central nervous system effects. May cause cardiac arrhythmia. May cause drowsiness and dizziness. Do not breathe vapour. Irritating to eyes and skin. Avoid contact with skin, eyes and clothing. At higher temperatures, (>250 C),



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Decomposition products may include hydrofluoric acid (HF) and carbonyl halides. The ACGIH Threshold Limit Values (2007) for Hydrogen Fluoride are TLV-TWA 0.5 ppm and Ceiling Exposure Limit 2 ppm.

Potential Health Effects

Skin : Avoid skin contact with leaking liquid (danger of frostbite).
May cause frostbite.

Irritating to skin.

Eyes : Causes serious eye irritation.
May cause frostbite.

Ingestion : Unlikely route of exposure.
Effects due to ingestion may include:
Gastrointestinal discomfort

Inhalation : Gas reduces oxygen available for breathing.
Causes asphyxiation in high concentrations.
The victim will not realize that he/she is suffocating.
Inhalation may cause central nervous system effects.
May cause cardiac arrhythmia.
Vapours may cause drowsiness and dizziness.

Chronic Exposure : None known.

Carcinogenicity No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP, IARC, or OSHA.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical nature : Mixture

Chemical Name	CAS-No.	Concentration
1,1,1-Trifluoroethane	420-46-2	52 %

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Pentafluoroethane	354-33-6	44%
1,1,1,2-Tetrafluoroethane	811-97-2	4 %

SECTION 4. FIRST AID MEASURES

Inhalation	: Move to fresh air. If breathing is irregular or stopped, administer artificial respiration. Use oxygen as required, provided a qualified operator is present. Call a physician. Do not give drugs from adrenaline-ephedrine group.
Skin contact	: After contact with skin, wash immediately with plenty of water. If there is evidence of frostbite, bathe (do not rub) with lukewarm (not hot) water. If water is not available, cover with a clean, soft cloth or similar covering. If symptoms persist, call a physician.
Eye contact	: Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. In case of frostbite water should be lukewarm, not hot. If symptoms persist, call a physician.
Ingestion	: Unlikely route of exposure. As this product is a gas, refer to the inhalation section. Do not induce vomiting without medical advice. Call a physician immediately.

Notes to physician

Treatment	: Because of the possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, should be used with special caution and only in situations of emergency life support. Treatment of overexposure should be directed at the control of symptoms and the clinical conditions. Treat frostbitten areas as needed.
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SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media	: The product is not flammable. ASHRAE34 Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
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Specific hazards during firefighting	: Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Contents under pressure. This product is not flammable at ambient temperatures and atmospheric Pressure. However, this material can ignite when mixed with air under pressure and exposed to strong ignition sources. Container may rupture on heating. Cool closed containers exposed to fire with water spray. Do not allow run-off from fire fighting to enter drains or water courses. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. In case of fire hazardous decomposition products may be produced such as: Hydrogen fluoride Carbon monoxide Carbon dioxide (CO ₂) Carbonyl halides
Special protective equipment : for firefighters	: In the event of fire and/or explosion do not breathe fumes. Wear self-contained breathing apparatus and protective suit. No unprotected exposed skin areas.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions	: Immediately evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Wear personal protective equipment. Unprotected persons must be kept away. Remove all sources of ignition. Avoid skin contact with leaking liquid (danger of frostbite). Ventilate the area. After release, disperses into the air. Vapours are heavier than air and can cause suffocation by reducing Oxygen available for breathing. Avoid accumulation of vapours in low areas. Unprotected personnel should not return until air has been Tested and determined safe. Ensure that the oxygen content is $\geq 19.5\%$.
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Environmental precautions : Prevent further leakage or spillage if safe to do so. The product evaporates readily.

Methods for cleaning up : Ventilate the area.

SECTION 7. HANDLING AND STORAGE Handling

Handling : Handle with care.
Avoid inhalation of vapour or mist.
Do not get in eyes, on skin, or on clothing.
Wear personal protective equipment.
Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50 °C.
Follow all standard safety precautions
For handling and Use of compressed gas cylinders.
Use authorized cylinders only.
Protect cylinders from physical damage.
Do not puncture or drop cylinders,
Expose them to open flame or excessive heat.
Do not pierce or burn, even after use.
Do not spray on a naked flame or any incandescent material.
Do not remove screw cap until immediately ready for use.
Always replace cap after use.

Advice on protection : The product is not flammable.
Against fire and explosion Can form a combustible mixture with air at pressures above atmospheric pressure.

Storage

Requirements for storage: Pressurized container: protect from sunlight and do not expose areas and containers to temperatures exceeding 50 °C. Do not pierce or burn, even after use.
Keep containers tightly closed in a dry, cool and well-ventilated place.
Storage rooms must be properly ventilated.
Ensure adequate ventilation, especially in confined areas.
Protect cylinders from physical damage.

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SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Protective measures : Do not breathe vapour.
 Do not get in eyes, on skin, or on clothing.
 Ensure that eyewash stations and safety showers are close to the workstation location.

Engineering measures: General room ventilation is adequate for storage and handling.
 Perform filling operations only at stations with exhaust ventilation facilities.

Eye protection : Wear as appropriate:
 Safety glasses with side-shields
 If splashes are likely to occur, wear:
 Goggles or face shield, giving complete protection to eyes
 Hand protection : Leather gloves
 In case of contact through splashing:
 Protective gloves Neoprene gloves
 Polyvinyl alcohol or nitrile- butyl-rubber gloves

Skin and body protection: Avoid skin contact with leaking liquid (danger of frostbite).
 Wear cold insulating gloves/ face shield/ eye protection.

Respiratory protection: In case of insufficient ventilation, wear suitable respiratory equipment.
 Wear a positive-pressure supplied-air respirator.
 Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.
 For rescue and maintenance work in storage tanks use self-contained Breathing apparatus.

Hygiene measures : Handle in accordance with good industrial hygiene and safety practice.
 Do not get in eyes, on skin, or on clothing.
 Ensure adequate ventilation, especially in confined areas.
 Remove and wash contaminated clothing before re-use.
 Keep working clothes separately.

Exposure Guidelines

Components	CAS-No.	Value	Control parameters	Updated	Basis	

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1,1,1-Trifluoroethane	420-46-2	TWA : time weighted average	(1,000 ppm)	
1,1,1-Trifluoroethane	420-46-2	TWA : time weighted average	3,400 mg/m3 (1,000 ppm)	2007
Pentafluoroethane	354-33-6	TWA : time weighted average	4,900 mg/m3 (1,000 ppm)	2007
Pentafluoroethane	354-33-6	TWA : time weighted average	(1,000 ppm)	
1,1,1,2-Tetrafluoroethane	811-97-2	TWA : time weighted average	(1,000 ppm)	
1,1,1,2-Tetrafluoroethane	811-97-2	TWA : time weighted average	4,240 mg/m3 (1,000 ppm)	2007

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state : Liquefied gas

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Color : Colorless

Odor : weak

pH : neutral

Melting point/freezing point : no data available

Boiling point/boiling range : -47.8 °C

Flash point : not applicable

Evaporation rate : > 1 Method: Compared to CCl₄.

Lower explosion limit : None

Upper explosion limit : None

Vapour pressure : 12,610 hPa at 21.1°C(70.0 °F)

25,572 hPa at 54.4 °C(129.9 °F)

Vapor density : 3.43 Note: (Air = 1.0)

Density : 1.08 g/cm³ at 21.1 °C

Water solubility : Note: Very slightly soluble in cold water, hot water.

Partition coefficient: n- : log Pow: 1.06

octanol/water Test substance : 1,1,1,2-tetrafluoroethane (HFC-134a)

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Ignition temperature : < 750 °C

Decomposition temperature : > 250 °C

Global warming potential (GWP) : 3,784

Ozone depletion potential : 0 (ODP)

SECTION 10. STABILITY AND REACTIVITY

Chemical stability : Stable under normal conditions.

Possibility of hazardous reactions : Hazardous polymerisation does not occur. Conditions to avoid : Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50 °C.

Decomposes under high temperature.
Some risk may be expected of corrosive and toxic decomposition products.
Can form a combustible mixture with air at pressures above atmospheric pressure.

Do not mix with oxygen or air above atmospheric pressure.

Incompatible materials to avoid : Finely divided aluminium
Potassium
Calcium
Powdered metals
Aluminium
Magnesium
Zinc

Hazardous decomposition products produced : In case of fire hazardous decomposition products may be products such as:
Gaseous hydrogen fluoride (HF).
Carbonyl halides
Carbon monoxide
Carbon dioxide (CO₂)

**R404 A****SECTION 11. TOXICOLOGICAL INFORMATION**

Acute inhalation toxicity

1,1,1-Trifluoroethane : LC50: > 540000 ppm
Exposure time: 4 h
Species: rat
LC50: > 106 mg/l
Exposure time: 4 h
Species: rat

Pentafluoroethane : > 769000 ppm
Exposure time: 4 h
Species: rat

1,1,1,2-Tetrafluoroethane : LC50: > 500000 ppm
Exposure time: 4 h
Species: rat

Sensitisation

1,1,1-Trifluoroethane : Cardiac sensitization
Species: dogs
Note: 1,1,1,2-tetrafluoroethane (HFC-134a):
Cardiac sensitisation threshold (dog): 80000 ppm. Pentafluoroethane
: Cardiac sensitization
Species: dogs
Note: No-observed-effect level
75 000 ppm
Lowest observable effect level
100 000 ppm

1,1,1,2-Tetrafluoroethane : Cardiac sensitization
Species: dogs
Note: No-observed-effect level
50 000 ppm
Lowest observable effect level
75 000 ppm
Repeated dose toxicity



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1,1,1-Trifluoroethane : Species: rat
 Application Route: Inhalation
 Exposure time: (90 d)
 NOEL:40000ppm
 Subchronic toxicity

Pentafluoroethane : Species: rat
 Application Route: Inhalation Exposure time: (4 Weeks)
 NOEL:50000ppm
 Subchronic toxicity

1,1,1,2-Tetrafluoroethane : Species: rat
 NOEL: 40000 ppm

Genotoxicity in vitro
 1,1,1-Trifluoroethane : Test Method: Ames test
 Result: negative

Pentafluoroethane : Test Method: Ames test
 Result: negative

1,1,1,2-Tetrafluoroethane : Note: In vitro tests did not show mutagenic effects
 : Cell type: Human lymphocytes
 Result: negative
 : Cell type: Human lymphocytes
 Result: negative
 : Cell type: Chinese Hamster Ovary Cells
 Result: negative

Genotoxicity in vivo

1,1,1-Trifluoroethane : Species: mouse
 Cell type: Bone marrow
 Application Route: Inhalation
 Result: negative
 Teratogenicity



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1,1,1-Trifluoroethane : Species: rat
 Application Route: Inhalation exposure
 NOAEL, Teratog: 40,000 ppm
 NOAEL, Maternal: 40,000 ppm
 Note: Did not show teratogenic effects in animal experiments.

Species: rabbit
 Application Route: Inhalation exposure
 NOAEL, Teratog: 40,000 ppm
 NOAEL, Maternal: 40,000 ppm
 Note: Did not show teratogenic effects in animal experiments.

Pentafluoroethane : Species: rabbit
 Application Route: Inhalation exposure
 NOAEL, Teratog: 50,000 ppm
 NOAEL, Maternal: 50,000 ppm
 Note: Did not show teratogenic effects in animal experiments.

Species: rat
 Application Route: Inhalation exposure
 NOAEL, Teratog: 50,000 ppm
 NOAEL, Maternal: 50,000 ppm
 Note: Did not show teratogenic effects in animal experiments.

Further information : Note: Acute Health Hazard Ethane, pentafluoro- (HFC-125):
 Cardiac sensitisation threshold (dog): 75000 ppm. 1,1,1trifluoroethane (HFC-143a): Cardiac
 sensitisation threshold (dog): >250000 ppm. 1,1,1,2-tetrafluoroethane (HFC-134a): Cardiac sensitisation
 threshold (dog): 80000 ppm. Vapours are heavier than air and can cause suffocation by reducing oxygen
 available for breathing. Irritating to eyes and skin. Rapid evaporation of the liquid may cause frostbite.
 Avoid skin contact with leaking liquid (danger of frostbite). May cause cardiac arrhythmia. Chronic Health
 Hazard 1,1,1trifluoroethane (HFC-143a): Not mutagenic in AMES Test.

SECTION 12. ECOLOGICAL INFORMATION

Biodegradability
 Pentafluoroethane : Result: Not readily biodegradable.
 Value: 5 %

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Method: OECD 301 D

Further information on ecology

Additional ecological

This product contains greenhouse gases which may
information contribute to global warming. Do NOT vent to the atmosphere.

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods : Observe all Federal, State, and Local Environmental
regulations.

SECTION 14. TRANSPORT INFORMATION

DOT UN/ID No.: UN 3337
Proper shipping name : REFRIGERANT GAS R 404A
Class 2.2
Packing group 2.2
Hazard Labels

IATA UN/ID No. : UN 3337
Description of the goods : REFRIGERANT GAS R 404A
Class : 2.2
Hazard Labels : 2.2
Packing instruction (cargo : 200 aircraft)
Packing instruction : 200
(passenger aircraft)

IMDG UN/ID No. : UN 3337
Description of the goods : REFRIGERANT GAS R 404A Class
: 2.2

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Hazard Labels : 2.2
EmS Number : F-C, S-V
Marine pollutant : no

SECTION 15. REGULATORY INFORMATION**Inventories**

US. Toxic Substances : On TSCA Inventory Control Act

Australia. Industrial : On the inventory, or in compliance with the inventory
Chemical (Notification and Assessment)
Act

Canada. Canadian : All components of this product are on the Canadian DSL list.
Environmental Protection
Act (CEPA). Domestic
Substances List (DSL)

Japan. Kashin-Hou Law : On the inventory, or in compliance with the inventory
List

Korea. Existing Chemicals : On the inventory, or in compliance with the inventory Inventory (KECI)

Philippines. The Toxic : On the inventory, or in compliance with the inventory Substances
and Hazardous and Nuclear Waste Control
Act

China. Inventory of Existing : On the inventory, or in compliance with the inventory
Chemical Substances

NZIOC - New Zealand : On the inventory, or in compliance with the inventory

National regulatory information



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Hazards : Acute Health Hazard
Sudden Release of Pressure Hazard

Spill or releases resulting in the loss of any ingredient at or about its RQ require immediate notification to the National Response Center and your local Emergency Planning Committee

CAS Number : 1,1,1-Trifluoroethane 420-46-2

WHMIS Classification : A : Compressed Gas
This product has been classified according to the hazard criteria of the CPR and the MSDS contains all of the information required by the CPR.

Global warming potential : 3,784

Ozone depletion potential : 0 (ODP)

SECTION 16. OTHER INFORMATION

HMIS III NFPA

Health hazard : 1 2
Flammability : 1 1
Physical Hazard : 0
Instability : 0

Hazard rating and rating systems (e.g. HMIS® III, NFPA): This information is intended solely for the use of individuals trained in the particular system.

**R404 A****Further information**

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Prepared by: Reflex Industries Limited
Issuing Date: 09/01/2017 Revision Date: 09/01/2020