



Safety Data Sheet

Product:

R404a

Page: 1/4

Revision Date: 05/11/2018

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

Product Name R404a
 Other/Generic Names HFC-404a; Blend-04A
 Chemical Formula CHF2CF3, CH3CF3, CH2FCF3
 Product Use Refrigerant
 Company Identification BNF Industries Pte Ltd
 17 Changi South Street 1,
 Singapore 486781
 Emergency phone number (65) 6742 6118
 Fax (65) 6742 6119

2. HAZARDS IDENTIFICATION

Classification of the substance or mixture
Classification acc. to Regulation (EC) No. 1272/2008/EC
 H280 Gases under pressure: Compressed gas

Label elements

Hazard pictograms:



Signal word: Warning

Hazard statement(s):

H280 Contains gas under pressure; may explode if heated. May displace oxygen and cause rapid suffocation.

Precautionary statements

P410+P403 Protect from sunlight. Store in a well-ventilated place.

Other hazards

None

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS No.	Concentration
1,1,1-Trifluoroethane (HFC-143a)	420-46-2	52.00%
Pentafluoroethane (HFC-125)	354-33-6	44.00%
1,1,1,2-Tetrafluoroethane (HFC-134a)	811-97-2	4.00%

4. FIRST AID MEASURES

First Aid Skin

Promptly flush skin with water until all chemical is removed. 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. Get medical attention if symptoms persist.

First Aid Eyes

Immediately flush eyes with large amounts of water for at least 15 minutes (in case of frostbite, water should be lukewarm, not hot) lifting eyelids occasionally to facilitate irrigation. Get medical attention if symptoms persist.

First Aid Inhalation

Immediately remove to fresh air. If breathing has stopped, give artificial respiration. Use oxygen as required, provided a qualified operator is available. Get medical attention immediately. DO NOT give epinephrine (adrenaline).

First Aid Ingestion

Ingestion is unlikely because of the physical properties and is not expected to be hazardous. DO NOT induce vomiting unless instructed to do so by a physician.

Advice to Physician: 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.

5. FIRE FIGHTING MEASURES

Suitable extinguishing media

The product is not flammable. Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Specific hazards during firefighting

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 firefighting to enter drains or water courses. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.

Specific methods

If possible, stop flow of product. Move container away or cool with water from a protected position.

Special protective equipment for fire fighters

Use self-contained breathing apparatus and chemically protective clothing.

6. ACCIDENTAL RELEASE MEASURES

In case of Spill or Leak

Use Halogen leak detector or other suitable means to locate leaks or check atmosphere. Keep unwind. Evacuate enclosed spaces and disperse gas with floor-level forced-air ventilation. Exhaust vapours outdoors. Do not smoke or operate internal combustion engines. Remove flames and heating elements.

7. HANDLING AND STORAGE

Normal Handling

(Always wear recommended PPE)

Avoid breathing vapors and liquid contact with eyes, skin or clothing. Do not puncture or drop cylinders, expose them to open flame or excessive heat. Use authorized cylinders only. Follow standard safety precautions for handling and use of compressed gas cylinders.





Safety Data Sheet

Product:

R404a

Page: 2/4

Revision Date: 05/11/2018

Storage recommendations

Store in a cool, well-ventilated area of low fire risk and out of direct sunlight. Protect cylinder and its fittings from physical damage. Storage in subsurface locations should be avoided. Close valve tightly after use and when empty.

8. EXPOSURE CONTROL/PERSONAL PROTECTION

Engineering controls

Provide local ventilation at filling zones and areas where leakage is probable. Mechanical (general) ventilation may be adequate for other operating and storage areas.

Eye/Face Protection

For normal conditions, wear safety glasses. Where there is reasonable probability of liquid contact, wear chemical safety goggles.

Skin Protection

Skin contact with refrigerant may cause frostbite. General work clothing and gloves (leather) should provide adequate protection. If prolonged contact with liquid or gas is anticipated, insulated gloves constructed of PVA, neoprene or butyl rubber should be used. Any contaminated clothing should be promptly removed and washed before reuse.

Respiratory Protection

None generally required for adequately ventilated work situations. For accidental release or non-ventilated situations, or release into confined space, where the concentration may be above the PEL of 1,000 ppm, use a self-contained, NIOSH approved breathing apparatus or supplied air respirator. For escape: use the former or a NIOSH approved gas mask with organic vapor canister.

Additional Recommendations

Where contact with liquid is likely, such as in a spill or leak, impervious boots and clothing should be worn. High dose-level warning signs are recommended for areas of principle exposure. Provide eyewash stations and quickdrench shower facilities at convenient locations. For tank cleaning operations, see OSHA regulations, 29 CFR 1910.132 and 29 CFR 1910.133.

Occupational exposure guidelines

Ingredient Name	Limit
1,1,1-Trifluoroethane (HFC-143a)	*1000ppm TWA (8hr)
Pentafluoroethane (HFC-125)	*1000ppm TWA (8hr)
1,1,1,2-Tetrafluoroethane (HFC-134a)	*1000ppm TWA (8hr)

* = Workplace Environmental Exposure Level (AIHA)

ACGIH TLV: None

OSHA PEL: None

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance/Colour: Clear, colourless liquid and vapour
 Physical State: Gas at ambient temperatures
 Molecular Weight: 120
 Chemical Formula: CHF₂CF₃, CH₃CF₃, CH₂FCF₃
 Odour: Faint ethereal odour
 Odor Threshold: No data available
 pH: Neutral
 Boiling Point: -47.8°C
 Freezing Point: No data available
 Critical Temperature: 72°C
 Flash Point: N/A
 Evaporation Rate: >1 (CCL4 = 1.0)
 Flammability: Non-flammable
 Flammability Range: None
 Auto-ignition temperature: >750°C
 Decomposition temperature: >250°C
 Vapor Pressure: 12.61 bar (21.1°C)
 Vapor Density: 3.43 (air = 1.0)
 Relative Density: 1.08 g/cm³ (21.1°C)
 Water Solubility: No data available
 Partition coefficient, n-octanol/water: log Pow: 1.06 (HFC-134a)
 Global warming potential (GWP): 3,922
 Ozone depletion potential (ODP): 0

10. STABILITY AND REACTIVITY

Reactivity

Not classified as a reactivity hazard.

Chemical Stability

Stable if used as directed. Follow precautionary advice and avoid incompatible materials and conditions.

Possibility of hazardous reactions

Hazardous polymerisation does not occur.

Conditions to avoid

Heat, flames and sparks

Incompatible materials

Oxidizing agents

Hazardous decomposition products

Halogenated compounds, hydrogen fluoride, carbonyl halides, carbon oxides.





Safety Data Sheet

Product:

R404a

Page: 3/4

Revision Date: 05/11/2018

11. TOXICOLOGY INFORMATION

Acute toxicity

- HFC-125: LC50: 4 hr. (rat) - > 800,000 ppm
Cardiac Sensitization threshold (dog) 75,000 ppm.
- HFC-134a: LC50 : 4 hr. (rat) - > 500,000 ppm
Cardiac Sensitization threshold (dog) > 80,000 ppm.
- HFC-143a: LC50 : 4 hr. (rat) - > 540,000 ppm
Cardiac Sensitization threshold (dog) > 250,000 ppm.

Delayed (subchronic and chronic) effects

- HFC-125: Teratogenic NOEL (rat and rabbit) - 50,000 ppm
Subchronic inhalation (rat) NOEL - ≥50,000 ppm
Chronic NOEL – 10,000 ppm
- HFC-134a: Teratogenic NOEL (rat and rabbit) – 40,000 ppm
Subchronic inhalation (rat) NOEL - 50,000 ppm
Chronic NOEL – 10,000 ppm
- HFC-143a: Teratogenic NOEL (rat and rabbit) - 50,000 ppm
Subchronic inhalation (rat) NOEL - ≥50,000 ppm

Skin corrosion/irritation

Not classified based on available information.

Serious eye damage/eye irritation

Not classified based on available information.

Skin sensitization

Not classified based on available information.

Respiratory sensitization

Not classified based on available information.

Germ cell mutagenicity

Not classified based on available information.

Carcinogenicity

Not classified based on available information.

Reproductive toxicity

Not classified based on available information.

Aspiration toxicity

Not classified based on available information.

12. ECOLOGICAL INFORMATION

Ecotoxicity

No known ecological damage caused by this product.

Acute toxicity - Fish

- HFC-125 LC50 (Oncorhynchus mykiss, 96h): 450 mg/l
- HFC-134a LC50 (Oncorhynchus mykiss, 96h): 450 mg/l
- HFC-143a LC50 (Oncorhynchus mykiss, 96h): >100 mg/l

Acute toxicity – Aquatic Invertebrates

- HFC-125 EC50 (Daphnia magna, 48h): >980 mg/l
- HFC-134a EC50 (Daphnia magna, 48h): 980 mg/l
- HFC-143a EC50 (Daphnia magna, 48h): >100 mg/l

Acute toxicity – Aquatic Plants

- HFC-125 EC50 (green algae, 96h): >114 mg/l
- HFC-134a EC50 (green algae, 96h): 142 mg/l
- HFC-143a EC50 (green algae, 96h): > 44 mg/l

Biodegradability

Not applicable to gases and gas mixtures.

Bioaccumulative potential

No data available

Other adverse effects

Results of PBT and vPvB assessment

Not classified as PBT or vPvB

Global Warming Potential

3,922

Contains fluorinated greenhouse gases covered by the Kyoto protocol. When discharged in large quantities may contribute to the greenhouse effect.

13. DISPOSAL CONSIDERATIONS

Waste from residues

Dispose of in accordance with local regulations

Contaminated packaging

Empty containers should be taken to an approved waste handling site for recycling or disposal. Empty pressure vessels should be returned to the supplier. If not otherwise specified, dispose of as unused product.

14. TRANSPORT INFORMATION

ADD/RID

- UN number: UN 3337
- Proper shipping name: REFRIGERANT GAS R 404A
- Class: 2
- Classification code: 2A
- Hazard number: 20
- Tunnel restriction code: (C/E)
- Emergency action code: 2TE
- Packing group: -
- Labels: 2.2

IMDG

- UN number: UN 3337
- Proper shipping name: REFRIGERANT GAS R 404A
- Class: 2.2
- Packing group: Not assigned by regulation
- Labels: 2.2
- EmS Code: F-C, S-V
- Marine pollutant: No

IATA

- UN number: UN 3337
- Proper shipping name: REFRIGERANT GAS R 404A
- Class: 2.2
- Packing group: Not assigned by regulation
- Labels: Non-flammable, non-toxic Gas
- Packing instruction: 200

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable for product as supplied.





Safety Data Sheet

Product:

R404a

Page: 4/4

Revision Date: 05/11/2018

Other transport information

Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product, containers ensure that they are firmly secured. Ensure that the valve outlet cap nut or plug (where provided) is correctly fitted. Ensure that the valve protection device (where provided) is correctly fitted. Ensure adequate ventilation. Ensure compliance with applicable regulations. Ensure that the container valve is closed and not leaking.

15. REGULATORY INFORMATION

Classification and labelling

The product may be due to classification and labelling according to national regulations in each case.

Other regulation and guidance

The provisions of occupational, health, environment and consumer protection shall apply to the country where the chemical substance or mixture is placed on the market.

16. OTHER INFORMATION

Ensure all national/local regulations are observed. Ensure operators understand the flammability hazard. The hazard of asphyxiation is often overlooked and must be stressed during operator training. Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out.

Advice

Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted. Details given in this document are believed to be correct at the time of going to press.

This MSDS is for information purposes only and is subject to change without notice.

