

SAFETY DATA SHEET
Refrigerant Gas R134a

Version 2
Revision Date: 20.02.12



SAFETY DATA SHEET
REFRIGERANT R134A

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

1.1. Product Identifier

Product Name: REFRIGERANT R134a

Synonyms: 1,1,1,2 Tetrafluoroethane
HFC-134a
Norflurane

EC Number: 212-337-0

CAS Number: 811-97-2

REACH Registration Number: 01-2119459374-33-0002

If REACH registration numbers do not appear the substance is either exempt from registration, does not meet the minimum volume threshold for registration or the registration has not yet come due.

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

Regulation (EC) No. 1272/2008



Warning

H280 Contains gas under pressure; may explode if heated
P410+P403 Protect from sunlight. Store in a well-ventilated place.

Directives 67/458/EEC or This substance is not classified as dangerous according to Directive 67/548/EEC.

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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

Label elements under CHIP:

Risk phrases R58: May cause long-term adverse effects in the environment
Safety phrases None

2.3. Other hazards

Directives 67/548/EEC or 1999/45/EC: Not a hazardous substance according to EC directives 67/548/EEC or 1999/45/EC.
Special labelling of certain mixtures: Contains fluorinated greenhouse gases covered by the Kyoto Protocol

SECTION 3: COMPOSITION / INFORMATION ON INGREDIENTS

3.1. Substances

Hazardous Ingredients: 1,1,1,2-tetrafluoroethane 99.9%

3.2 Mixtures

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

Skin contact: Rapid evaporation of liquid may cause frostbite. 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: Rapid evaporation of liquid in contact with the eye will damage it. 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, move to fresh air, and lie down. Keep patient warm and at rest. Artificial respiration and/or oxygen may be necessary. Consult a physician.

4.2. Most important symptoms and effects, both acute and delayed

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

Eye contact: Exposure to liquid will cause severe pain and cornea damage.

Ingestion: Not a route of exposure.

Inhalation: High vapour concentrations cause severe headache, dizziness and unconsciousness.

Delayed/immediate effects: May cause cardiac arrhythmia.

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

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5.1. Extinguishing media

Extinguishing media: This product is not flammable. (ASHRAE 34) All extinguishing agents are suitable. Use 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 Pressure build-up in cylinders/tanks.
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.
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.

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: For handling and protection measures refer to Section 7 of SDS. Refer to Section 8 of SDS.
For disposal methods refer to Section 13.

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: Keep valves tightly closed.
Store in cool, dry well ventilated place.
Temperature not to exceed 45°C.

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

7.3. Specific end use(s)

Specific end use(s) No data available.

SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1. Control parameters

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Hazardous ingredients:

1,1,1,2-TETRAFLUOROETHANE (HFC134a)

Workplace exposure limits

State	8 hour TWA	15 min. STEL
UK	1000 ppm (4240 mg/m ³)	-

8.2. Derived No Effect Level (DNEL)

1,1,1,2-Tetrafluoroethane: Type of Application (Use): Workers
Exposure Routes: Inhalation
Health Effects: Chronic effects, Systemic toxicity.
Value: 2476 mg/m³

Type of Application (Use): Consumers
Exposure Routes: Inhalation
Health Effects: Chronic effects, Systemic toxicity.
Value: 2476 mg/m³

8.3 Predicted No Effect Concentration

1,1,1,2-tetrafluoroethane: Value: 0.1 mg/l
Compartment: Fresh water.

Value: 0.01 mg/l
Compartment: Marine water.

Value: 1 mg/l
Compartment: Water
Remarks: Intermittent use/release.

Value: 0.75 mg/l
Compartment: Fresh water sediment.

Value: 73 mg/l
Compartment: Water
Remarks: Sewage treatment plants.

8.4. Exposure Controls

Engineering measures: Ensure adequate ventilation, especially in confined areas.
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 clothing that covers legs and arms.
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: Slight, ether like.
Molecular weight: 102.02 g/mol
Boiling Point/range: -26.2°C

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Flash Point:	Non-flammable
Ignition Temperature:	n/a Non flammable
Upper explosive limit/upper flammability limit:	n/a Non flammable
Vapour pressure:	4.909 Bar (4909 hPa) at 21°C
Liquid Density:	1200 kg/m ³ at 25°C
Vapour Density:	5.368 kg/m ³ at 21°C
Water solubility:	1.5 g/l
Vapour Density (Air = 1)	3.5

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 occur under recommended storage and transport conditions. May react with aluminium.

10.4. Conditions to avoid

Conditions to avoid: Heat, hot surfaces, flames.

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: 1,1,2-Tetrafluoroethane
Not Applicable.

Acute inhalation toxicity: 1,1,1,2-Tetrafluoroethane
LC₅₀/rat: 567000 ppm
/dog: Cardiac sensitization.

Acute Dermal toxicity: 1,1,1,2-Tetrafluoroethane
Not Applicable

Skin Irritation: 1,1,1,2-Tetrafluoroethane
Rabbit
Classification: Not classified as irritant.
Result: Slight irritation.

Eye Irritation: 1,1,1,2-Tetrafluoroethane
Rabbit
Classification: Not classified as an irritant.
Result: Slight irritation
Not expected to cause eye irritation based on expert review of the properties of the substance.

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Human
Classification: Not classified as irritant.
Result: No eye irritation.

Sensitization: 1,1,1,2-Tetrafluoroethane
Guinea pig
Classification: Not a skin sensitized.
Result: Did not cause sensitization on laboratory animals.
Not expected to cause sensitization based on expert review of the properties of the substance.

Did not cause sensitization on laboratory animals. There are no reports of human respiratory sensitization.

Repeated Dose Toxicity: 1,1,1,2-Tetrafluoroethane
Inhalation rat
No toxicologically significant effects were found.

Mutagenicity Assessment 1,1,1,2-Tetrafluoroethane
Animal testing did not show any mutagenic effects, Tests on bacterial or mammalian cell cultures did not show mutagenic effects.

Carcinogenicity Assessment: 1,1,1,2-Tetrafluoroethane
Not classified as a human carcinogen.

Toxicity to reproduction Assessment: 1,1,1,2-Tetrafluoroethane
No toxicity to reproduction.

Human Experience: Excessive exposure may affect human health as follows:

Inhalation
Severe shortness of breath, narcosis, irregular cardiac activity.

Other information: May cause cardiac arrhythmia. Rapid evaporation of the liquid may cause frostbite. Inhalation of decomposition products in high concentration may cause shortness of breath (lung oedema).

SECTION 12. ECOLOGICAL INFORMATION

Where sections are blank no data is available

12.1. Toxicity

Toxicity to fish: 1,1,1,2-Tetrafluoroethane
LC₅₀/96 h/Oncorhynchus mykiss (rainbow trout): 450 mg/l

Toxicity to Aquatic plants: 1,1,1,2-Tetrafluoroethane
EC₅₀/72 h/Algae: >118 mg/l
Information given is based on data obtained from similar substances.

Acute Toxicity to aquatic Invertebrates: 1,1,1,2-Tetrafluoroethane
EC₅₀/48 h/Daphnia magna (water flea): 980 mg/l

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

12.2. Persistence and degradability

Persistence and Degradability: Biodegradability
/28 d
Biodegradation: 3%
Method: Closed Bottle test
Not readily biodegradable.

12.3. Bio accumulative potential

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Bio-accumulative potential: No data available.

12.4. Mobility in soil

Mobility: No data available.

12.5. Results of PBT and vPvB assessment

PBT & vPvB identification: This substance is not considered to be persistent, bio accumulating nor toxic (PBT).
This substance is not considered to be very persistent nor very bio accumulating (vPvB).

12.6. Other adverse effects

Other adverse effects:
Global Warming Potential (GWP) (CO₂ = 1) 1370

Ozone Depletion Potential (ODP) (R11 = 1) 0

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

Proper Shipping Name: Refrigerant R134a or 1,1,1,2-Tetrafluoroethane
UN Number: 3159
Class: 2
Classification Code: 2A
Labelling No.: 2.2
HI Number: 20
Tunnel Code: (C/E)

14.2. IATA_C

Proper Shipping Name: Refrigerant R134a or 1,1,1,2-Tetrafluoroethane
UN Number: 3159
Labelling No.: 2.2

14.3. IMDG

Proper Shipping Name: Refrigerant R134a or 1,1,1,2-Tetrafluoroethane
UN Number: 3159
Class: 2.2
Labelling Number: 2.2

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. Chemical Safety Assessment

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Chemical safety assessment: A chemical safety assessment has 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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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°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



NATIONAL REFRIGERANTS, INC.

R-404A

Safety Data Sheet

R-404A

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: R-404A
OTHER NAME: Pentafluoroethane, 1,1,1-Tetrafluoroethane, 1,1,1,2-Tetrafluoroethane
USE: Refrigerant Gas
DISTRIBUTOR: National Refrigerants, Inc.
661 Kenyon Avenue
Bridgeton, New Jersey 08302

FOR MORE INFORMATION CALL:
(Monday-Friday, 8:00am-5:00pm)
1-800-262-0012

IN CASE OF EMERGENCY CALL:
CHEMTREC: 1-800-424-9300

2. HAZARDS IDENTIFICATION

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



EMERGENCY OVERVIEW: Colorless, volatile liquid with ethereal and faint sweetish odor. Non-flammable material. Overexposure may cause dizziness and loss of concentration. At higher levels, CNS depression and cardiac arrhythmia may result from exposure. Vapors displace air and can cause asphyxiation in confined spaces. At higher temperatures, (>250°C), decomposition products may include Hydrofluoric Acid (HF) and carbonyl halides.

POTENTIAL HEALTH HAZARDS

SKIN: Irritation would result from a defatting action on tissue. Liquid contact could cause frostbite.

EYES: Liquid contact can cause severe irritation and frostbite. Mist may irritate.

INHALATION: R-404A is low in acute toxicity in animals. When oxygen levels in air are reduced to 12-14% by displacement, symptoms of asphyxiation, loss of coordination, increased pulse rate and deeper respiration will occur. At high levels, cardiac arrhythmia may occur.

INGESTION: Ingestion is unlikely because of the low boiling point of the material. Should it occur, discomfort in the gastrointestinal tract from rapid evaporation of the material and consequent evolution of gas would result. Some effects of inhalation and skin exposure would be expected.

DELAYED EFFECTS: None known.



3. COMPOSITION / INFORMATION ON INGREDIENTS

<u>INGREDIENT NAME</u>	<u>CAS NUMBER</u>	<u>WEIGHT %</u>
Pentafluoroethane (HFC-125)	354-33-6	44
1,1,1-Trifluoroethane (HFC-143a)	420-46-2	52
1,1,1,2-Tetrafluoroethane (HFC-134a)	811-97-2	4

COMMON NAME and SYNONYMS

R-404A; HFC-404A

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

4. FIRST AID MEASURES

- 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.
- 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.
- 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. Do not give epinephrine (adrenaline).
- 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

FLAMMABLE PROPERTIES

FLASH POINT:	Gas, not applicable per DOT regulations
FLASH POINT METHOD:	Not applicable
AUTOIGNITION TEMPERATURE:	<750°C
UPPER FLAME LIMIT (volume % in air):	None*
LOWER FLAME LIMIT (volume % in air):	None*
	*Based on ASHRAE Standard 34 with match ignition
FLAME PROPAGATION RATE (solids):	Not applicable
OSHA FLAMMABILITY CLASS:	Not applicable

EXTINGUISHING MEDIA:

Use any standard agent – choose the one most appropriate for type of surrounding fire (material itself is not flammable)



UNUSUAL FIRE AND EXPLOSION HAZARDS:

R-404A is not flammable at ambient temperatures and atmospheric pressure. However, this material will become combustible when mixed with air under pressure and exposed to strong ignition sources. Contact with certain reactive metals may result in formation of explosive or exothermic reactions under specific conditions (e.g. very high temperatures and/or appropriate pressures).

SPECIAL FIRE FIGHTING PRECAUTIONS/INSTRUCTIONS:

Firefighters should wear self-contained, NIOSH-approved breathing apparatus for protection against possible toxic decomposition products. Proper eye and skin protection should be provided. Use water spray to keep fire-exposed containers cool.

6. ACCIDENTAL RELEASE MEASURES

IN CASE OF SPILL OR OTHER RELEASE: (Always wear recommended personal protective equipment.)

Evacuate unprotected personnel. Product dissipates upon release. Protected personnel should remove ignition sources and shut off leak, if without risk, and provide ventilation. Unprotected personnel should not return to the affected area until air has been tested and determined safe, including low-lying areas.

Spills and releases may have to be reported to Federal and/or local authorities. See Section 15 regarding reporting requirements.

7. HANDLING AND STORAGE

NORMAL HANDLING: (Always wear recommended personal protective equipment.)

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.

R-404A should not be mixed with air above atmospheric pressure for leak testing or any other purpose.

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.

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.

8. EXPOSURE CONTROLS / 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.

PERSONAL PROTECTIVE EQUIPMENT

SKIN PROTECTION:

Skin contact with refrigerant may cause frostbite. General work clothing and gloves (leather) should provide adequate protection. If prolonged contact with the 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.

EYE PROTECTION:

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

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 quick-drench shower facilities at convenient locations. For tank cleaning operations, see OSHA regulations, 29 CFR 1910.132 and 29 CFR 1910.133.

EXPOSURE GUIDELINES

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

* = Workplace Environmental Exposure Level (AIHA)

OTHER EXPOSURE LIMITS FOR POTENTIAL DECOMPOSITION PRODUCTS:

Hydrogen Fluoride: ACGIH TLV: 2 ppm ceiling, 0.5 ppm TLV-TWA

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE:	Clear, colorless liquid and vapor
PHYSICAL STATE:	Gas at ambient temperatures
MOLECULAR WEIGHT:	120
CHEMICAL FORMULA:	CHF ₂ CF ₃ , CH ₃ CF ₃ , CH ₂ FCF ₃
ODOR:	Faint ethereal odor
SPECIFIC GRAVITY (water = 1.0):	1.08 @ 21.1°C (70°F)
SOLUBILITY IN WATER (weight %):	Unknown
pH:	Neutral
BOILING POINT:	-47.8°C (-54.0°F)
FREEZING POINT:	Not Determined
VAPOR PRESSURE:	182.9 psia @ 70°F 370.9 psia @ 130°F
VAPOR DENSITY (air = 1.0):	3.43
EVAPORATION RATE:	>1 COMPARED TO: CCl ₄ = 1
% VOLATILES:	100
ODOR THRESHHOLD:	Not established
FLAMMABILITY:	Not applicable
LEL/UEL:	None/None
RELATIVE DENSITY:	1.08 g/cm ³ at 21.1 C



PARTITION COEFF (n-octanol/water) Not applicable
AUTO IGNITION TEMP: >750°C
DECOMPOSITION TEMPERATURE: >250° C
VISCOSITY: Not applicable
FLASH POINT: Not applicable
(Flash point method and additional flammability data are found in Section 5.)

10. STABILITY AND REACTIVITY

NORMALLY STABLE: (CONDITIONS TO AVOID):

The product is stable.

Do not mix with oxygen or air above atmospheric pressure. Any source of high temperature, such as lighted cigarettes, flames, hot spots or welding may yield toxic and/or corrosive decomposition products.

INCOMPATIBILITIES:

(Under specific conditions: e.g. very high temperatures and/or appropriate pressures) – Freshly abraded aluminum surfaces (may cause strong exothermic reaction). Chemically active metals: potassium, calcium, powdered aluminum, magnesium and zinc.

HAZARDOUS DECOMPOSITION PRODUCTS:

Halogens, halogen acids and possibly carbonyl halides.

HAZARDOUS POLYMERIZATION:

Will not occur.

11. TOXICOLOGICAL INFORMATION

IMMEDIATE (ACUTE) EFFECTS:

HFC-125: LC₅₀ : Inhalation 4 hr. (rat) - > 800,000 ppm / Cardiac Sensitization threshold (dog) 75,000 ppm
HFC-143a: LC₅₀ : Inhalation 4hr. (rat) - > 540,000 ppm / Cardiac Sensitization threshold (dog) > 250,000 ppm
HFC-134a: LC₅₀ : Inhalation 4hr. (rat) - > 500,000 ppm / Cardiac Sensitization threshold (dog) > 80,000 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-143a: Teratogenic NOEL (rat and rabbit) – 50,000 ppm
Subchronic inhalation (rat) NOEL - ≥ 50,000 ppm
HFC-134a: Teratogenic NOEL (rat and rabbit) – 40,000 ppm
Subchronic inhalation (rat) NOEL – 50,000 ppm / Chronic NOEL – 10,000 ppm

OTHER DATA:

HFC-125, HFC-134a: Not active in four genetic studies
HFC-143a: Not active in two genetic studies

REPEATED DOSE TOXICITY:

Lifetime inhalation exposure of male rats was associated with a small increase in salivary gland fibrosarcomas.

FURTHER INFORMATION:

Acute effects of rapid evaporation of the liquid may cause frostbite. Vapors are heavier than air and can displace oxygen causing difficulty breathing or suffocation. May cause cardiac arrhythmia.



POTENTIAL HEALTH HAZARDS

SKIN: Irritation would result from a defatting action on tissue. Liquid contact could cause frostbite.

EYES: Liquid contact can cause severe irritation and frostbite. Mist may irritate.

INHALATION: R-404A is low in acute toxicity in animals. When oxygen levels in air are reduced to 12-14% by displacement, symptoms of asphyxiation, loss of coordination, increased pulse rate and deeper respiration will occur. At high levels, cardiac arrhythmia may occur.

INGESTION: Ingestion is unlikely because of the low boiling point of the material. Should it occur, discomfort in the gastrointestinal tract from rapid evaporation of the material and consequent evolution of gas would result. Some effects of inhalation and skin exposure would be expected.

DELAYED EFFECTS: None known.

Ingredients found on one of the OSHA designated carcinogen lists are listed below

<u>INGREDIENT NAME</u>	<u>NTP STATUS</u>	<u>IARC STATUS</u>	<u>OSHA LIST</u>
No ingredients listed in this section			

FURTHER INFORMATION:

Acute effects of rapid evaporation of the liquid may cause frostbite. Vapors are heavier than air and can displace oxygen causing difficulty breathing or suffocation. May cause cardiac arrhythmia.

12. ECOLOGICAL INFORMATION

Degradability (BOD): R-404A is a gas at room temperature; therefore, it is unlikely to remain in water.
Octanol Water Partition Coefficient: See section 9

13. DISPOSAL CONSIDERATIONS

RCRA

Is the unused product a RCRA hazardous waste if discarded? Not a hazardous waste.
If yes, the RCRA ID number is: Not applicable.

OTHER DISPOSAL CONSIDERATIONS:

Disposal must comply with federal, state, and local disposal or discharge laws. R-404A is subject to U.S. Environmental Protection Agency Clean Air Act Regulations Section 608 in 40 CFR Part 82 regarding refrigerant recycling.

The information offered here is for the product as shipped. Use and/or alterations to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

14. TRANSPORT INFORMATION

US DOT ID NUMBER: UN3337
US DOT PROPER SHIPPING NAME: Refrigerant gas R 404A
US DOT HAZARD CLASS: 2.2
US DOT PACKING GROUP: Not applicable

For additional information on shipping regulations affecting this material, contact the information number found in Section 1.



15. REGULATORY INFORMATION

TOXIC SUBSTANCES CONTROL ACT (TSCA)

TSCA INVENTORY STATUS: Components listed on the TSCA inventory

OTHER TSCA ISSUES: Subject to Section 12 (b) export notification. May contain 0-10ppm Ethane, 2-chloro-1,1,1-trifluoro CAS # 75-88-7

SARA TITLE III / CERCLA

“Reportable Quantities” (RQs) and/or “Threshold Planning Quantities” (TPQs) exist for the following ingredients.

INGREDIENT NAME

SARA / CERCLA RQ (lb.)

SARA EHS TPO (lb.)

No ingredients listed in this section

Spills or releases resulting in the loss of any ingredient at or above its RQ requires immediate notification to the National Response Center [(800) 424-8802] and to your Local Emergency Planning Committee.

SECTION 311 HAZARD CLASS: IMMEDIATE PRESSURE

SARA 313 TOXIC CHEMICALS:

The following ingredients are SARA 313 “Toxic Chemicals”. CAS numbers and weight percents are found in Section 2.

INGREDIENT NAME

COMMENT

No ingredients listed in this section

STATE RIGHT-TO-KNOW

In addition to the ingredients found in Section 2, the following are listed for state right-to-know purposes.

INGREDIENT NAME

WEIGHT %

COMMENT

No ingredients listed in this section

ADDITIONAL REGULATORY INFORMATION:

R-404A is subject to U.S. Environmental Protection Agency Clean Air Act Regulations at 40 CFR Part 82.

WARNING: Contains Pentafluoroethane (HFC-125), 1,1,1-trifluoroethane, tetrafluoroethane, greenhouse gases which may contribute to global warming. **Do not vent** to the atmosphere. To comply with provisions of the U.S. Clean Air Act, any residual must be recovered.

CALIFORNIA PROPOSITION 65:

The ingredients in this product do not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

WHMIS CLASSIFICATION (CANADA):

This product has been evaluated in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.



FOREIGN INVENTORY STATUS:

EU – EINECS # 2065578 – HFC-125
2069965 – HFC-143a
223770 – HFC-134a

16. OTHER INFORMATION

CURRENT ISSUE DATE: April, 2018

PREVIOUS ISSUE DATE: April, 2015

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

Regulatory Standards:

1. OSHA regulations for compressed gases: 29 CFR 1910.101
2. DOT classification per 49 CFR 172.101

Toxicity information per PAFT Testing

DISCLAIMER:

National Refrigerants, Inc. believes that the information and recommendations contained herein (including data and statements) are accurate as of the date hereof. NO WARRANTY OF FITNESS FOR ANY PARTICULAR PURPOSE, WARRANTY OF MERCHANTABILITY, OR ANY OTHER WARRANTY, EXPRESSED OR IMPLIED, IS MADE CONCERNING THE INFORMATION PROVIDED HEREIN. The information provided herein relates only to the specific product designated and may not be valid where such product is used in combination with any other methods or use of the product and of the information referred to herein are beyond the control of National Refrigerants. National Refrigerants expressly disclaims any and all liability as to any results obtained or arising from any use of the product or reliance on such information.

Safety Data Sheet

Section 1: Identification

Product Identifier

Product Name

Trade Name:

PN (Part number):

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

-Material for industrial applications

-Industrial and professional use

-Consumer end use

Details of the supplier of the safety data sheet

Manufacturer

Emergency telephone number

Section 2: Hazard(s) Identification

OSHA/HCS status

This material is not considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture

Not a hazardous substance or mixture

GHS label elements

Hazard pictograms-No Pictogram

Signal word-No Signal Word

Hazard statements-Not a hazardous substance or mixture

Precautionary statements

Prevention

Not a hazardous substance or mixture

Response

IF SWALLOWED: Relatively non-toxic. Ingestion of sizable amount (over 100ml) may cause some gastrointestinal upset and temporary central nervous system depression. Effects appear more severe in individuals with kidney problems.

IF ON SKIN (or hair): Mild irritant and defatting agent, especially on prolonged contact.

IF IN EYES: May cause transitory stinging and tearing.

IF EXPOSED or CONCERNED:

Immediately call a POISON CENTER or a doctor/physician.

Storage

Store in a well-ventilated place.

Disposal

Dispose of contents and container in accordance with all local, regional, national and international regulations.

Hazards not otherwise classified

Product is stable.

Section 3: Composition/Information on Ingredients

Substance/mixture:Mixture

Chemical name: Propylene Glycol or Glycerin

Other means of identification: No

CAS number/other identifiers

Ingredient name	%	CAS number
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Does not contain hazardous substances

Section 4: First Aid Measurements

Description of necessary first aid measures

Eye contact: Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 30 minutes. Cold water may be used. Get medical attention immediately.

Inhalation: Bring accident victims out into the fresh air. Call a physician immediately in severe cases or if recovery is not rapid.

Skin contact: After contact with skin, wash immediately with plenty of water. Remove contaminated clothing and wash before reuse.

Ingestion: Rinse mouth with water. If swallowed, give a glass of water to drink. If vomiting occurs give further water. Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact

Contact with eyes cause slight temporary irritation.

Inhalation

Not expected to be acute effects from inhalation.

Skin contact

Skin contact with the product is not likely to result in a significant irritation.

Ingestion

High doses may cause CNS depression (fatigue, dizziness and possibly loss of concentration, with collapse, coma and death in cases of severe over-exposure).

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician

In case of ingestion, monitor for acidosis and central nervous system changes. Exposed persons with previous kidney dysfunction may require special treatment

Specific treatments

Treat symptomatically.

Protection of first-aiders

N/A

See toxicological information (Section 11)

Section 5: Fire Fighting Measures

Extinguishing media

Suitable extinguishing media

SMALL FIRE: Use DRY chemical powder, CO₂ or appropriate foam.

LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Unsuitable extinguishing media

Do not use water jet.

Specific hazards arising from the chemical

No data available

Hazardous thermal decomposition products/Products of combustion

Products of combustion are carbon oxides (CO, CO₂).

Special protective actions for fire fighters

Do not release runoff from fire control methods to sewers or waterways.

Special protective equipment for fire-fighters

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full face piece operated in the pressure demand or other positive pressure mode.

Section 6: Accidental Release Measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel

Do not touch or walk through spilt material. Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Shut off all ignition sources.

Environmental precautions

Methods and materials for containment and cleaning up:

Exposure to the spilled material may be severely irritating or toxic. Follow personal protective equipment recommendations found in Section 8 of this SDS. Personal protective equipment needs must be evaluated based on information provided on this sheet and the special circumstances created by the spill including: the material spilled, the quantity of the spill, the area in which the spill occurred, and the expertise of employees in the area responding to the spill. Never exceed any occupational exposure limits.

Prevent the spread of any spill to minimize harm to human health and the environment if safe to do so. Wear complete and proper personal protective equipment following the recommendation of Section 8 at a minimum. Dike with suitable absorbent material like granulated clay. Gather and store in a sealed container pending a waste disposal evaluation. Shut off ignition sources; including electrical equipment and flames.

Section 7: Handling and Storage

Precautions for safe handling

Protective measures, advice on general occupational hygiene and conditions for safe storage, including any incompatibilities:

No special measures required. It is not considered a hazardous material in most industrial operations. Protect containers from physical damage. Sources of ignition such as smoking and open flames prohibited where this product is handled.

Store in a tightly closed containers in a cool, dry, well ventilated area away from sources of heat, moisture and incompatible substances. The suitable storage temperature is between 15-30°C temperatures. It is generally recommended that temperatures not exceeding 40°C.

Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid).

Section 8: Exposure Controls/Personal Protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits			
	ACGIH		OSHA	
Propylene Glycol	(TWA)	(STEL)	(TWA)	(STEL)
	10 mg/m ³	N/A	474 mg/m ³	N/A

Appropriate engineering controls and Environmental exposure controls

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, Industrial Ventilation, A Manual of Recommended Practices, most recent edition, for details.

Individual protection measures

Hygiene measures

No special protective clothing is normally required. Select protective clothing depending on industrial operations. Use mechanical ventilation equipment that is explosion-proof.

Eye/face protection: Use chemical safety goggles.

Skin protection

Hand protection and Body protection: Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Other skin protection

Wash hands and other exposed areas with mild soap and water before eating or drinking.

Respiratory protection: No respiratory protection required under normal circumstances. Approved organic vapor chemical cartridge or supplied air respirators should be worn when significant vapors are generated. Observe respirator assigned protection factors (APFs) criteria cited in federal OSHA 1910.134. Self-contained breathing apparatus should be used for firefighting.

Respirator Type(s) (NIOSH Approved): If the exposure limit is exceeded and engineering controls are not feasible, a half face piece particulate respirator (NIOSH type N95 or better filters) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full face piece particulate respirator (NIOSH type N100 filter) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency, or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids, Glycerin, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full face piece positive-pressure, air-supplied respirator. **WARNING:** Air-purifying respirators do not protect workers in Oxygen-deficient atmospheres.

Section 9: Physical and Chemical Properties

Appearance

Physical state: Colorless liquid

Odor: None

Odor threshold: No Data Available

pH: ~7

Specific Gravity: 1.01

Melting point: -14°C

Boiling point: 185°C

Flash point: No Data Available

Evaporation rate (BuAc=1): No Data Available

Flammability (solid, gas): Not flammable

Lower and upper explosive (flammable) limits: LEL 2.4%, UEL 17.4% (propylene glycol)

Vapor pressure: 0.2 hPa at 20°C (propylene glycol)

Vapor density (Air=1): 2.62 (propylene glycol)

Solubility: Soluble in water

Partition coefficient: n-octanol/water: ~ -0.92 (propylene glycol)

Auto-ignition temperature: ~371°C (propylene glycol)

Decomposition temperature: No Data Available

Viscosity: No Data Available

VOC%: 0

Section 10: Stability and Reactivity

Reactivity

Stable under recommended storage conditions.

Chemical stability

Stable under recommended storage conditions.

Possibility of hazardous reactions

Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid

Temperatures above the flash point and avoid excessive heat, open flame or other sources of ignition.

Incompatible materials

Can react with strong oxidizing agents and strong acids.

Hazardous decomposition products

Ignition and burning can release carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

Section 11: Toxicological Information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Test	Results
Propylene glycol	Acute toxicity, oral (male rat)	LD50 = 22,000 mg/kg
	Acute toxicity, dermal	LD50 = 20,800 mg/kg

Summary Comments:

Sensitization

Product/ingredient name	Test	Results	Basis
Propylene glycol		No evidence of sensitization effect	

Summary Comments:

Carcinogenicity

Product/ingredient name	Test	Results	Basis
Propylene glycol		No known carcinogenic effects	

Summary Comments:

Specific target organ toxicity (single exposure)

Product/ingredient name	Test	Results	Basis
Propylene glycol		No information available	

Summary Comments:

Specific target organ toxicity (repeated exposure)

Product/ingredient name	Test	Results	Basis
Propylene glycol		No information available	

Summary Comments:

Aspiration hazard

Product/ingredient name	Test	Results	Basis
Propylene glycol		No information available	

Summary Comments:

Information on the likely routes of exposure

Inhalation may blur vision. Ingesting may irritate the gastrointestinal tract.

Potential acute health effects

Eye contact: May cause transient eye irritation and discomfort.

Inhalation: Harmful concentrations of vapor do not normally arise except under high temperature or high atomization. High concentrations of mist may give rise to respiratory irritation.

Skin contact: Nonirritant on incidental contact.

Ingestion: No adverse effects expected, however, large amounts may cause nausea and vomiting.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact: Eye irritation.

Inhalation: Nausea.

Skin contact: Skin irritation.

Ingestion: Irritation of the gastrointestinal tract, nausea and vomiting.

Potential chronic health effects (Propylene glycol)

Carcinogenicity: Not Classifiable as a Human Carcinogen.

Mutagenicity: Negative for genotoxicity using both in vitro and in vivo tests.

Teratogenicity: Results from studies in pregnant rats, mice, hamsters and rabbits demonstrate that propylene glycol is not teratogenic or fetotoxic.

Developmental effects: Results from studies in pregnant rats, mice, hamsters and rabbits demonstrate that propylene glycol is not teratogenic or fetotoxic

Fertility effects: No data available.

Numerical measures of toxicity

Acute toxicity estimates

Section 12: Ecological Information

Toxicity

Acute Fish toxicity: (Propylene glycol)

LC50 - Oncorhynchus mykiss (rainbow trout) – 40,613 mg/L - 96 h

LC50 – Pimephales promelas (fathead minnow) - 52,930 mg/l - 96 h

Acute toxicity for daphnia: (Propylene glycol)

EC50 - Daphnia magna (Water flea) – 10,000 mg/L - 48 h

Acute toxicity for algae: (Propylene glycol)

EC50 - Scenedesmus capricornutum (fresh water algae) - 19,000 mg/L - 96 h

Acute bacterial toxicity: (Propylene glycol)

No data available.

Ecotoxicology Assessment: (Propylene glycol)

Material is not expected to be toxic to aquatic life.

Persistence and degradability

Biodegradability: (Propylene glycol)

Readily biodegradable in aerobic conditions. There is evidence that it is degraded under anaerobic conditions.

Stability in water: (Propylene glycol)

Environmental releases of propylene glycol will tend to partition to water and soil, with little potential for evaporation.

Photodegradation: (Propylene glycol)

No data available

Volatility (Henry's Law constant): (Propylene glycol)

Partition coefficient n-octanol/water (log K_{ow}) = No data available

Bioaccumulative potential

Bioaccumulation: (Propylene glycol)

Bioconcentration factor (BCF): 0.09

Mobility in soil: (Propylene glycol)

Distribution among environmental compartments:

Environmental releases of propylene glycol will tend to partition to water and soil, with little potential for evaporation.

Other adverse effects:

This material is expected to be non-hazardous to aquatic species, and not considered to be persistent, bioaccumulating nor toxic.

Section 13: Disposal Considerations

Disposal methods

Dispose in accordance with applicable international, national and local laws, ordinances and statutes.

Section 14: Transport Information

UN Number: N/A

UN Proper Shipping Name: Not Regulated

Exemptions: N/A

Transport hazard Class(es): N/A

Packing Group: N/A

Land Transport ADR/RID and GGVS/GGVE (Cross Border / Domestic)

Transport Hazard Class(es): Not Regulated

Maritime Transport IMDG/GGVSea

Transport Hazard Class(es): Not Regulated

Marine Pollutant: No

Air Transport ICAO-TI and IATA-DGR

Transport Hazard Class(es): Not Regulated

Section 15: Regulatory Information

Chemical Inventory Status-Part 1

Ingredient (CAS#)	TSCA	EC	Japan	Australia
Propylene glycol (57-55-6)	Yes	Yes	Yes	Yes

Chemical Inventory Status-Part 2

Ingredient (CAS#)	Korea	Canada	Canada	Philippines
		DSL	NDSL	
Propylene glycol (57-55-6)	Yes	Yes	No	Yes

Federal, State & International Regulations-Part 1

Ingredient (CAS#)	SARA 302		SARA 313	
	RQ	TPQ	List Chemical	Category
Propylene glycol (57-55-6)	No	No	No	No

Federal, State & International Regulations-Part 2

Ingredient (CAS#)	RCRA		TSCA
	CERCLA	261.33	8(d)
Propylene glycol (57-55-6)	No	No	No

Chemical Weapons Convention: No

TSCA 12b: No

CDTA: No

SARA 311/312:

Acute: Yes, Chronic: No, Fire: No, Pressure: No, Reactivity: No

Mixture/Liquid

Australian Hazchem Code: None allocated

Poison Schedule: None allocated

Section 16: Other Information

History

Date of issue: 07/16/15

Version: 2a

Revised Sections(s): Name change

Prepared by:

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of the suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.