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# MATERIAL SAFETY DATA SHEET

## R404A

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### MATERIAL IDENTIFICATION

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Product Name	R404A
Chemical Family	Hydrofluorocarbons
Chemical Formula	CF <sub>3</sub> CH <sub>2</sub> F/CF <sub>3</sub> CH <sub>2</sub> F/CF <sub>3</sub> CH <sub>3</sub>
Chemical Name	1,1,1,2-tetrafluoroethane (HCFC-134a)/Pentafluoroethane (HFC-125)/ 1,1,1-Trifluoroethane (HFC-143a)
Product Use	Refrigerant Blend

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### COMPOSITION/INFORMATION ON INGREDIENTS

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Ingredient Name	CAS No.	Typical Wt.
Ethane, 1,1,1-trifluoro-	420-46-2	52%
Ethane, pentafluoro-	354-33-6	44%
1,1,1,2-Tetrafluoroethane(HFC-134a)	811-97-2	4%

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### HAZARDS IDENTIFICATION

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#### Emergency Overview

Colorless liquefied gas with faint ether odor.

#### WARNING!

LIQUID AND GAS UNDER PRESSURE, OVERHEATING AND OVERPRESSURIZING MAY CAUSE GAS RELEASE OR VIOLENT CYLINDER BURSTING. MAY DECOMPOSE ON CONTACT WITH FLAMES OR EXTREMELY HOT METAL SURFACES TO PRODUCE TOXIC AND CORROSIVE PRODUCTS. VAPOR REDUCES OXYGEN AVAILABLE FOR BREATHING AND IS HEAVIER THAN AIR. HARMFUL IF INHALED AND MAY CAUSE HEART



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IRREGULAROTIES, UNCONSCIOUSNESS OR DEATH. LIQUID CONTACT WITH EYES OR SKIN MAY CAUSE FROSTBITE.

#### **Potential Health Effects**

Skin contact and inhalation are expected to be the primary routes of occupational exposure to this material. As with most liquefied gases, contact with the rapidly volatilizing liquid can cause frostbite to any issue. High vapor concentrations are irritating to the eyes and respiratory tract and may result in central nervous system (CNS) effects such as headache, dizziness, drowsiness and, in severe exposure, loss of consciousness and death. The dense vapor of this material may reduce the available oxygen for breathing. Prolonged exposure to an oxygen deficient atmosphere may be fatal. Inhalation may cause an increase in the sensitivity of the heart to adrenaline, which could result in irregular or rapid heart beats. Medical conditions aggravated by exposure to this material include heart disease or compromised heart function.

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## **FIRST AID MEASURES**

IF IN EYES, immediately flush with plenty of water. Get medical attention if irritation persists.

IF ON SKIN, Flush exposed skin with lukewarm water (not hot), or use other means to warm skin slowly. Get medical attention if frostbitten by liquid or if irritation occurs.

IF SWALLOWED, Not applicable- product is a gas at ambient temperatures.

IF INHALED, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention. Do not give adrenaline, epinephrine or similar drugs following exposure to this product.

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## **FIRE FIGHTING MEASURES**

#### **Fire and Explosive Properties**

Auto-Ignition Temperature	NA	
Flash Point	NA-GAS	Flash Point Method
Flammable Limits-Upper	NA	
Lower	NA	

#### **Extinguishing Media**

Use extinguishing media appropriate to surrounding fire conditions..



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### **Fire Fighting Instructions**

Stop the flow of gas if possible. Use water spray on person making shut-off. Fire fighters and others who may be exposed to products of combustion should wear full fire fighting turn out gear (full Banker Gear) and self-contained breathing apparatus (pressure demand NIOSH approved or equivalent). Fire fighting equipment should be thoroughly decontaminated after use.

### **Fire and Explosion Hazards**

May decompose on contact with flames or extremely hot metal surfaces to produce toxic and corrosive products. Liquid and gas under pressure, overheating or overpressurizing may cause gas release and/or violent cylinder bursting. Container may explode if heated due to resulting pressure rise. Some mixtures of HCFCs and/or HFCs, and air or oxygen may be combustible if pressurized and exposed to extreme heat or flame.

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## **ACCIDENTAL RELEASE MEASURES**

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### **In Case of Spill or Leak**

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

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## **HANDLING AND STORAGE**

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### **Handling**

Avoid breathing gas. Avoid contact with eyes, skin and clothing. Keep container closed. Use only with adequate ventilation. Do not enter confined spaces unless adequately ventilated.

### **Storage**

Do not apply direct flame to cylinder. Do not store cylinder in direct sun or expose it to heat above 120F. Do not drop or refill this cylinder. Keep away from heat, sparks and flames.

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## EXPOSURE CONTROLS/PERSONAL PROTECTION

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### Engineering Controls

Investigate engineering techniques to reduce exposures below airborne exposure limits. Provide ventilation if necessary to control exposure levels below airborne exposure limits (see below). If practical, use local mechanical exhaust ventilation at sources of air contamination such as open process equipment.

### Eye/Face Protection

Where there is potential for eye contact, wear chemical goggles and have eye flushing equipment available.

### Skin Protection

Wear appropriate chemical resistant protective clothing and chemical resistant gloves to prevent skin contact. Consult glove manufacturer to determine appropriate type glove material for given application. Rinse contaminated skin promptly. Wash contaminated clothing and clean protective equipment before reuse. Wash skin thoroughly after handling.

### Respiratory Protection

Avoid breathing gas. When airborne exposure limits are exceeded (see below), use NIOSH approved respiratory protection equipment appropriate to the material and/or its components (full facepiece recommended). Consult respirator manufacturer to determine appropriate type equipment for a given application. Observe respirator use limitations specified by NIOSH or the manufacturer. For emergency and other conditions where exposure limit may be significantly exceeded, use an approved full face positive-pressure, self-contained breathing apparatus or positive-pressure airline with auxiliary self-contained air supply. Respiratory protection programs must comply with 29 CFR § 1910.134.

### Airborne Exposure Guideline for Ingredients

Exposure Limit		Value
<b>1,1,1,2-Tetrafluoroethane (HFC-134a)</b>		
WEEL TWA	-	1000 ppm 4240mg/m <sup>3</sup>
<b>Ethane, pentafluoro-</b>		
WEEL TWA	-	4900mg/m <sup>3</sup> 1000ppm
<b>Ethane, 1,1,1-trifluoro-</b>		
WEEL TWA	-	3400mg/ m <sup>3</sup> 1000ppm

- Only those components with exposure limits are printed in this section.

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## PHYSICAL AND CHEMICAL PROPERTIES

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Appearance/Odor  
pH

Colorless liquefied gas with faint ether odor  
NA



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Specific Gravity	1.08@21C/70F
Vapor Pressure	169.6psia@70 F
Vapor Density	3.36
Melting Point	NE
Freezing Point	NE
Boiling Point	-47.8 C/ -54F
Solubility In Water	Negligible
Percent Volatile	100
Molecular Weight	97.60

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## STABILITY AND REACTIVITY

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### Stability

This material is chemically stable under specified conditions or storage, shipment and/or use. See HANDLING AND STORAGE section of this MSDS for specified conditions.

### Incompatibility

Avoid contact with strong alkali or alkaline earth metals, finely powdered metals such as aluminum, magnesium or zinc and strong oxidizers, since they may react or accelerate decomposition.

### Hazardous Decomposition Products

Thermal decomposition products include hydrogen fluoride, hydrogen chloride, carbon monoxide, carbon dioxide and chlorine.

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## TOXICOLOGICAL INFORMATION

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### Toxicological Information

#### 1,1,1,2-Tetrafluoroethane (HFC-134a)

No skin allergy was observed in guinea pigs following repeated exposure. Acute inhalation exposure produced anesthetic effects in mice, dogs, cats and monkeys. Repeated inhalation exposure produced no adverse effects in rats. Inhalation of this material, followed by intravenous injection of epinephrine to stimulate stress reactions, resulted in cardiac sensitization in dogs. Following long-term inhalation studies in rats, an increased incidence of benign tumors (at high concentrations) in the tests were the only tumors observed. No birth defects were noted in the offspring of rats exposed to this material by inhalation during pregnancy, even at dosages which produced significant adverse effects in the mother. This material produced no genetic changes in standard tests using bacterial or animal cells and whole animals. Single exposure (acute) studies indicate:



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Inhalation- Practically Non-toxic to Rats (4-hr LC50>500,000 ppm; 30-min LC50~750,000 ppm)

Eye Irritation-Slightly Irritating to Rabbits

Skin Irritation- Slightly Irritating to Rabbits (24-hr exposure)

Ethane, 1,1,1-trifluoro-

Inhalation, followed by intravenous injection of epinephrine to simulate stress reactions, resulted in cardiac sensitization in dogs. Following repeated inhalation exposure, lung irritant effects including mild bronchitis and pneumonia were observed in rats and guinea pigs. No adverse effects were observed in long-term oral studies with rats. No birth defects were noted in the offspring of rats or rabbits exposed by inhalation during pregnancy. No genetic changes were observed in standard tests using animal cells or whole animals. Both positive and negative results have been reported in tests using bacteria. Single exposure (acute) studies indicate

Inhalation – Practically Non- Toxic to Rats (4-hr LC50>540,000 ppm)

Ethane, pentafluoro-

Inhalation, followed by intravenous injection of epinephrine to stimulate stress reactions, resulted in cardiac sensitization in dogs. Following repeated inhalation exposure, no adverse effects were observed in rats. No birth defects were noted in the offspring of rats or rabbits exposed by inhalation during pregnancy. No genetic changes were observed in standard tests using bacteria, animal cells or whole animals. Single exposure (acute) studies indicate

Inhalation – Practically Non- Toxic to Rats (4-hr LC50>800,000 ppm)

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## ECOLOGICAL INFORMATION

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### Ecotoxicological Information

Ethane, 1,1,1,-trifluoro-

This material is practically non-toxic to *Daphnia magna* (48-hr LC50 300mg/l) and on more than slightly toxic to rainbow trout (96-hr LC50>40mg/l)

1,1,1,2-Tetrafluoroethane (HFC-134a)

Based on its low n-octanol/water partition coefficient (log Pow of 1.06), bioaccumulation of this material is considered unlikely.

### Chemical Fate Information

1,1,1,2-Tetrafluoroethane (HFC-134a)

Based on its low n-octanol/water partition coefficient (log Pow of 1.06), bioaccumulation of this material is considered unlikely. When evaluated in a 28 day activated sludge test, 3% degradation of this material was observed.



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Ethane, pentafluoro-

When released into the environment, this material may be expected to partition almost exclusively into the atmosphere. Based on its low n-octanol/water partition coefficient (log Pow of 1.48), bioaccumulation is considered unlikely. In a 28-day ready biodegradability closed bottle test, it appeared to be stable (about 2% degraded). This material does not dissociate in water.

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## DISPOSAL CONSIDERATIONS

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### Waste Disposal

Recover, reclaim or recycle when practical. Dispose of in accordance with country and local regulations.

Note: Chemical additions to, processing of, or otherwise altering this material may make this waste management information incomplete, inaccurate, or otherwise inappropriate. Furthermore, state and local waste disposal requirements may be more restrictive or otherwise different from country laws and regulations.

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## TRANSPORTATION INFORMATION

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DOT Name	Refrigerant Gas R404A
DOT Technical Name	1,1,1,2-tetrafluoroethane (HCFC-134a)/Pentafluoroethane (HFC-125)/ 1,1,1-Trifluoroethane (HFC-143a)
DOT Hazard Class	2.2
UN Number	UN 3337
DOT Packing Group	PG NA
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## REGULATORY INFORMATION

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### Hazard Categories Under Criteria of SAVA Title III Rules (40 CFR Part 370)

Immediate (Acute) Health: Yes

Fire: No

Delayed (Chronic) Health: No

Reactivity: No



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Sudden Release of Pressure: Yes

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## OTHER INFORMATION

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### Revision Information

Revision Data	13JUL 2002	Revision Number 3
Supersedes Revision Dated	16-JUN-2002	

### Revision Summary

Revised section 9.

### Key

NE= Not Established	NA= Not Applicable	(R) = Registered Trademark
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End of MSDS