

# COOLING SUPPLIES

## REFRIGERANT HFC-404A

### Material Safety Data Sheet

Date Prepared: 19/10/2010

### 1. PRODUCT AND COMPANY IDENTIFICATION

#### PRODUCT INFORMATION:

Name: HFC-404A, R404A

Use: Refrigerant

Formula: CF<sub>3</sub>-CHF<sub>2</sub>/CH<sub>3</sub>-CF<sub>3</sub>/CF<sub>3</sub>-CH<sub>2</sub>F

#### DISTRIBUTOR INFORMATION:

ILYS Ltd t/a Cooling Supplies

11A King St

Rangiora

New Zealand

Ph: 0274 746 786

Fax: 03 313 7631

**EMERGENCY TELEPHONE NUMBER 0800 746 786 (NZ only)**

### 2. COMPOSITION/INFORMATION ON INGREDIENTS

#### Components:

Material	CAS Number	%
PENTAFLUOROETHANE (HFC-125)	354-33-6	44
ETHANE, 1,1,1-TRIFLUORO- (HFC-143a)	420-46-2	52
ETHANE, 1,1,1,2-TETRAFLUORO- (HFC-134a)	811-97-2	4

### 3. HAZARDS IDENTIFICATION

#### Potential Health Effects

##### INHALATION

Inhalation of high concentrations of vapor may cause heart irregularities, unconsciousness, or death. Intentional misuse or deliberate inhalation may cause death without warning. Vapor reduces oxygen available for breathing and is heavier than air. Overexposure to the vapors by inhalation may include temporary nervous system depression with anesthetic effects such as dizziness, headache, confusion, incoordination, and loss of consciousness. Higher exposures to the vapors may cause temporary alteration of the heart's electrical activity with irregular pulse, palpitations, or inadequate circulation or fatality from gross overexposure. Increased susceptibility to the effects of this material may be observed in persons with pre-existing disease of the central nervous system, cardiovascular system.

##### SKIN CONTACT

Liquid contact can cause frostbite.

##### EYE CONTACT

"Frostbite-like" effects may occur if the liquid or escaping vapors contact the eyes.

#### Carcinogenicity Information

None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.

## 4. FIRST AID MEASURES

### INHALATION

If high concentrations are inhaled, immediately remove to fresh air. Keep person calm. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

### SKIN CONTACT

In case of contact, immediately flush area with lukewarm water while removing contaminated clothing and shoes. Do not use hot water. If frostbite has occurred, call a physician. Treat for frostbite if necessary by gently warming affected area.

### EYE CONTACT

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

### INGESTION

Ingestion is not considered a potential route of exposure.

### Notes to Physicians

THIS MATERIAL MAY MAKE THE HEART MORE SUSCEPTIBLE TO ARRHYTHMIAS. Catecholamines such as adrenaline, and other compounds having similar effects, should be reserved for emergencies and then used only with special caution.

## 5. FIRE FIGHTING MEASURES

### Flammable Properties

Flash Point: No flash point

Flammable Limits in Air, % by Volume:

LEL: None per ASTM E681

UEL: None per ASTM E681

Auto ignition: Not determined

### Fire and Explosion Hazards:

Cylinders may rupture under fire conditions. Decomposition may occur. Contact of welding or soldering torch flame with high concentrations of refrigerant can result in visible changes in the size and color of torch flames. This flame effect will only occur in concentrations of product well above the recommended exposure limit, therefore stop all work and ventilate to disperse refrigerant vapors from the work area before using any open flames.

HFC-404A is not flammable in air at temperatures up to 100 deg. C (212 deg. F) at atmospheric pressure. However, mixtures of HFC-404A with high concentrations of air at elevated pressure and/or temperature can become combustible in the presence of an ignition source. HFC-404A can also become combustible in an oxygen enriched environment (oxygen concentrations greater than that in air). Whether a mixture containing HFC-404A and air, or HFC-404A in an oxygen enriched atmosphere become combustible depends on the inter-relationship of:

- 1) the temperature
- 2) the pressure, and
- 3) the proportion of oxygen in the mixture.

In general, HFC-404A should not be allowed to exist with air above atmospheric pressure or at high temperatures; or in an oxygen enriched environment. For example HFC-404A should NOT be mixed with air under pressure for leak testing or other purposes. Experimental data have also been reported which indicate combustibility of HFC-404A in the presence of certain concentrations of chlorine.

### Extinguishing Media

Use media appropriate for surrounding material.

### Fire Fighting Instructions

Cool tank/container with water spray. Self-contained breathing apparatus (SCBA) may be required if cylinders rupture or release under fire conditions. Water runoff should be contained and neutralized prior to release.

## 6. ACCIDENTAL RELEASE MEASURES

### Safeguards (Personnel)

NOTE: Please review the FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up. Ventilate area, especially low or enclosed places where heavy vapors might collect. Remove open flames. Use self-contained breathing apparatus (SCBA) if large spill or leak occurs.

## 7. HANDLING AND STORAGE

### Handling (Personnel)

Avoid breathing vapor. Avoid liquid contact with eyes and skin. Use with sufficient ventilation to keep employee exposure below recommended limits.

### Handling (Physical Aspects)

HFC-404A should not be mixed with air for leak testing or used for any other purpose above atmospheric pressure. See Flammable Properties section. Contact with chlorine or other strong oxidizing agents should also be avoided.

### Storage

Store in a clean dry place. Do not heat above 52 C (126 F). Valve protection caps and valve outlet threaded plugs must remain in place unless container is secured with valve outlet piped to use point. Do NOT drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Never attempt to lift cylinder by its cap. Use a pressure reducing regulator when connecting cylinder to lower pressure (>3000 psig) piping or systems. Do NOT heat cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder. Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Separate full containers from empty containers. Storage area temperatures should not exceed 126 deg F (52 deg C) and should be free of combustible materials. Avoid area where salt or other corrosive materials are present. Avoid excessive inventory and storage time. Use a first-in first-out system. Keep accurate inventory records.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### Engineering Controls

Normal ventilation for standard manufacturing procedures is generally adequate. Local exhaust should be used when large amounts are released. Mechanical ventilation should be used in low or enclosed places. Refrigerant concentration monitors may be necessary to determine vapor concentrations in work areas prior to use of torches or other open flames, or if employees are entering enclosed areas.

### Personal Protective Equipment

Impervious gloves and chemical splash goggles should be used when handling liquid. Under normal manufacturing conditions, no respiratory protection is required when using this product. Self-contained breathing apparatus (SCBA) is required if a large release occurs.

### Exposure Limits

#### HFC-125

**PEL (OSHA):** None Established

**TLV (ACGIH):** None Established

**AEL:** 1000 ppm, 8 & 12 Hr. TWA

**WEEL (AIHA):** 1000 ppm, 4900 mg/m<sup>3</sup>, 8 Hr. TWA

#### HFC-143a

**PEL (OSHA):** None Established

**TLV (ACGIH):** None Established

**AEL:** 1000 ppm, 8 & 12 Hr. TWA

**WEEL (AIHA):** 1000 ppm, 8 Hr. TWA

**HFC-134A****PEL (OSHA):** None Established**TLV (ACGIH):** None Established**AEL:** 1000 ppm, 8 & 12 Hr. TWA**WEEL (AIHA):** 1000 ppm, 8 Hr. TWA

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### Physical Data

**Boiling Point:** -46.7 C (-52.1 F) Average**Vapor Pressure:** 182.1 psia at 25 deg C (77 deg F)**% Volatiles:** 100 WT%**Evaporation Rate:** (CCL4 = 1); greater than 1**Solubility in Water:** Not determined**Odour:** Slight ethereal**Form:** Liquefied gas**Colour:** Clear, colourless**Specific Gravity:** 1.05 @ 25C (77F)

## 10. STABILITY AND REACTIVITY

### Chemical Stability

Stable.

### Conditions to Avoid

Avoid open flames and high temperatures.

### Incompatibility with Other Materials

Incompatible with alkali or alkaline earth metals - powdered Al, Zn, Be, etc.

### Decomposition

Decomposition products are hazardous. This material can be decomposed by high temperatures (open flames, glowing metal surfaces, etc.) forming hydrofluoric acid and possibly carbonyl fluoride. These materials are toxic and irritating. Contact should be avoided.

### Polymerization

Polymerization will not occur.

## 11. TOXICOLOGICAL INFORMATION

### Animal Data

#### HFC-125

##### Inhalation:

4 hour, ALC, rat: &gt; 709,000 ppm (Very low toxicity).

Single exposure to high doses caused: lethargy, labored breathing, weak cardiac sensitization, a potentially fatal disturbance of heart rhythm caused by a heightened sensitivity to the action of epinephrine. Repeated exposure caused: no significant toxicological effects. Lowest-Observed-Adverse-Effect-Level for cardiac sensitization: 100,000 ppm.

No-Observed-Adverse-Effect-Level (NOAEL): 50,000 ppm

##### Additional Toxicological Effects:

No animal data are available to define the following effects of this material: carcinogenicity, reproductive toxicity. In animal testing this material has not caused developmental toxicity. Tests have shown that this material does not cause genetic damage in bacterial or mammalian cell cultures, or in animals. This material has not been tested for its ability to cause permanent genetic damage in reproductive cells of mammals (not tested for heritable genetic damage).

**HFC-143a****Inhalation:**

4 hour LC50: > 540,000 ppm in rats (Very low toxicity by inhalation)

Single exposure to 500,000 ppm caused anesthesia, but no mortality at 540,000 ppm. Cardiac sensitization occurred in dogs at 300,000 ppm from the action of exogenous epinephrine. Two, 4-week inhalation studies have been conducted. In the first study, pathological changes in the testes were observed at all exposures concentrations; no effects were observed in females. The testicular effect was considered related to the method used to expose the rats to HFC-143a. In the second study using the same exposure concentrations, no effects were noted in males at any concentration. Data from a 90-day study revealed no effects in male or female rats at exposures up to 40,000 ppm.

**Ingestion:**

Long-term exposure caused significantly decreased body weights in male rats fed 300 mg/kg for 52 weeks, but there was no effect on mortality. During this long-term exposure study, tests in rats demonstrated no carcinogenic activity when HFC-143a was administered orally in corn oil at 300 mg/kg/day, five days a week, for 52 weeks and observed for an additional 73 weeks. Tests in animals demonstrate no developmental toxicity. No animal test reports are available to define reproductive hazards. Tests in bacterial cell cultures demonstrate mutagenic activity, but the compound did not induce oncogenic transformation of mammalian cells in culture. HFC-143a was not mutagenic in animals.

**HFC-134a****Inhalation:**

4 hour, ALC, rat: 567,000 ppm.

Single exposure caused: Cardiac sensitization, a potentially fatal disturbance of heart rhythm associated with a heightened sensitivity to the action of epinephrine. Lowest-Observed-Adverse-Effect-Level for cardiac sensitization: 75,000 ppm. Single exposure caused: Lethargy, Narcosis, Increased respiratory rates. These effects were temporary. Single exposure to near lethal doses caused: Pulmonary edema. Repeated exposure caused: Increased adrenals, liver, spleen weight. Decreased uterine, prostate weight. Repeated dosing of higher concentrations caused the following temporary effects: Tremors, Incoordination.

**Carcinogenic, Developmental, Reproductive, Mutagenic Effects:**

In a two-year inhalation study, HFC-134a, at a concentration of 50,000 ppm, produced an increase in late-occurring benign testicular tumors, testicular hyperplasia and testicular weight. The no-effect-level for this study was 10,000 ppm. Animal data show slight fetotoxicity but only at exposure levels producing other toxic effects in the adult animal. Reproductive data on male mice show: No change in reproductive performance. Tests have shown that this material does not cause genetic damage in bacterial or mammalian cell cultures, or in animals. In animal testing, this material has not caused permanent genetic damage in reproductive cells of mammals (has not produced heritable genetic damage).

**12. ECOLOGICAL INFORMATION****ECO-TOXICOLOGICAL INFORMATION****Aquatic Toxicity:****HFC-143a**

The compound is very low to slightly toxic.  
96 hr. LC50, rainbow trout: > 40 mg/L.

**HFC-134a**

48-hour EC50, Daphnia magna: 980 mg/L  
96-hour LC50, Rainbow trout: 450 mg/L

**13. DISPOSAL CONSIDERATIONS****Waste Disposal**

Comply with Federal, State, and local regulations. Reclaim by distillation or remove to a permitted waste disposal facility.

## 14. TRANSPORTATION INFORMATION

### Shipping Information

**Proper Shipping Name:** Refrigerant Gas R-404a

**Hazard Class:** 2.2

**UN No:** 3337

**Label(s):** Nonflammable Gas

**Shipping Containers:** Tank trucks, cylinders

## 15. REGULATORY INFORMATION

### U.S. Federal Regulations

**TSCA Inventory Status:** Listed.

**TITLE III HAZARD CLASSIFICATIONS SECTIONS 311, 312**

**Acute:** No

**Chronic:** No

**Fire:** No

**Reactivity:** No

**Pressure:** Yes

### HAZARDOUS CHEMICAL LISTS

**SARA Extremely Hazardous Substance:** No

**CERCLA Hazardous Substance:** No

**SARA Toxic Chemical:** No

## 16. OTHER INFORMATION

### NFPA, NPCA-HMIS

#### NPCA-HMIS Rating

**Health:** 1

**Flammability:** 0

**Reactivity:** 1

Personal Protection rating to be supplied by user depending on use conditions.

### Additional Information

#### MEDICAL USE

**CAUTION:** Do not use in medical applications involving permanent implantation in the human body.

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process. This information is based upon technical information believed to be reliable. It is subject to revision as additional knowledge and experience is gained.

**End of MSDS**