

# Material Safety Data Sheet

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## 1) PRODUCT IDENTIFICATION

Product Name	:	<b>KIRO 404A</b>
Molecular Formula	:	CHF <sub>2</sub> CF <sub>3</sub> /CF <sub>3</sub> CH <sub>3</sub> /CH <sub>2</sub> FCF <sub>3</sub>
Chemical Name	:	Mixture of R125, R143a & R134a
Chemical Family	:	Hydrofluorocarbon (HFC)
Safety Group	:	A1
Synonyms/Components	:	Pentafluoroethane : HFC-125 : 42-46 (44%) 1,1,1-trifluoroethane: HFC-143a : 51-53% (52%)  1,1,1,2- Tetrafluoroethane : HFC-134a : 2 – 6% (4%)
Product Use	:	Refrigerant

## 2) HAZARDOUS IDENTIFICATION

### Emergency Overview

Color	:	Clear – colourless
Physical State	:	Gas
Form	:	Liquefied Gas
Odor	:	Slightly ether like

### Caution !

- High Pressure Gas
- Liquid & Gas under pressure
- Overheating or over pressurizing may cause gas release or violent cylinder bursting.
- May decompose on contact with flames or extremely hot metal surfaces & produce toxic and corrosive products.
- Vapor reduces oxygen available for breathing and is heavier than air.
- May cause frostbite.
- May cause headache, nausea, dizziness, drowsiness, loss of consciousness.
- May cause effects on Heart.

### Potential Health Effects

#### **Primary routes of exposure ;**

Inhalation and skin contact.

#### **Signs and symptoms of acute exposure:**

Liquid: Rapid evaporation of the liquid may cause frostbite. Vapor: Vapor is heavier than air and can cause suffocation by reducing oxygen available for breathing. Central nervous system effects: headache, nausea, dizziness, drowsiness, loss of consciousness. Stress induced heart effects: irregular heart beat, rapid heart beat, (severity of effects depends on extent of exposure).

**Skin:**

Slightly irritating. (based on components) Contact with liquid or refrigerated gas can cause cold burns and frostbite.

**Inhalation:**

Practically nontoxic. (based on components)

**Eyes:**

Slightly irritating. (based on components)

**Medical conditions aggravated by overexposure:**

Heart disease or compromised heart function.

**3) FIRST AID MEASURES****Inhalation:**

If inhaled, remove victim to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

**Skin:**

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. Wash clothing before reuse. Thoroughly clean shoes before reuse.

**Eyes:**

Immediately flush eye(s) with plenty of water.

**Ingestion:**

Ingestion is not applicable - product is a gas at ambient temperatures.

**Notes to physician:**

Do not give drugs from adrenaline-ephedrine group.

**4) FIRE FIGHTING MEASURES**

**Flash point** Not applicable

**Auto-ignition temperature:** not determined

**Lower flammable limit (LFL):** None.

**Upper flammable limit (UFL):** None.

**Extinguishing media (suitable):**

Use extinguishing measures to suit surroundings.

**Protective equipment:**

Fire fighters and others who may be exposed to products of combustion should wear full fire fighting turn out gear (full Bunker Gear) and self-contained breathing apparatus (pressure demand / NIOSH approved or equivalent).

Fire fighting equipment should be thoroughly decontaminated after use.

**Further firefighting advice:**

- Keep containers cool by spraying with water if exposed to fire.
- Water mist should be used to reduce vapor concentrations in air.

**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.
- When burned, the following hazardous products of combustion can occur:  
Hydrogen fluoride.

**5) ACCIDENTAL RELEASE MEASURES**

**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. Stop the leak if you can do so without risk.

Consult a regulatory specialist to determine appropriate state or local reporting requirements, for assistance in waste characterization and/or hazardous waste disposal and other requirements listed in pertinent environmental permits

**6) HANDLING & STORAGE**

**Handling**

**General information on handling:**

- Avoid breathing gas.
- Keep container closed.
- Use only with adequate ventilation.
- Do not enter confined spaces unless adequately ventilated.
- Use equipment rated for cylinder pressure.
- Use a backflow preventative device in piping.
- Wash thoroughly after handling.
- Close valve after each use and when empty.
- Emptied container retains vapor and product residue.
- Observe all labeled safeguards until container is cleaned, reconditioned or destroyed.

**Storage**

**General information on storage conditions:**

- Store in well ventilated area away from heat and sources of ignition such as flame, sparks and static electricity.

**Storage stability – Remarks:**

- Do not apply direct flame to cylinder. Do not store cylinder in direct sun or expose it to heat above 120 F (48.9 C.).
- Do not drop or refill this cylinder.

**Storage incompatibility – General:**

Keep away from oxidizing agents and strongly acid or alkaline materials.

**Temperature tolerance – Do not store above**

118 °F (48 °C)

**7) EXPOSURE CONTROLS/PERSONAL PROTECTION****Engineering controls:**

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

**Respiratory protection:**

Avoid breathing gas. Where airborne exposure is likely or airborne exposure limits are exceeded, use respiratory protection equipment (full face piece recommended). Consult respirator manufacturer to determine appropriate type equipment for a given application. Observe respirator use limitations specified by the manufacturer.

**Skin protection:**

Wear appropriate chemical resistant protective clothing and chemical resistant gloves to prevent skin contact. Rinse immediately if skin is contaminated. Wash contaminated clothing and clean protective equipment before reuse. Wash thoroughly after handling.

**Eye protection:**

Use good industrial practice to avoid eye contact.

**8) PHYSICAL & CHEMICAL PROPERTIES**

**Color:** Clear - colorless

**Physical state:** gas

**Form:** Liquefied gas

**Odor:** Slightly ether-like

**pH:** not applicable

**Density:** not determined

**Specific Gravity (Relative density):** 1.05 (77 °F( 25 °C))

**Vapor pressure:** 8,445 mmHg (70.0 °F (21.1 °C))

**Vapor density:** 3.39 kg/m<sup>3</sup>

**Boiling point/boiling range:** -54.0 °F (-47.8 °C)

**Freezing point:** not determined

**Melting point:** not determined

**Solubility in water:** negligible

**% Volatiles:** 100 %

**Molecular weight:** 97.6 g/mol

## **9) STABILITY & REACTIVITY**

### **Stability:**

This material is chemically stable under normal and anticipated storage, handling and processing conditions.

### **Materials to avoid:**

- Strong oxidizing agents
- Strong acids
- Alkaline materials

### **Conditions / hazards to avoid:**

- Heat.

### **Hazardous decomposition products:**

- Thermal decomposition giving toxic and corrosive products :
  - Hydrogen fluoride
  - Carbon monoxide
  - Carbon dioxide (CO<sub>2</sub>)
  - Carbonyl halides

## **10) TOXICOLOGICAL INFORMATION**

### **Immediate Accute toxicity**

HFC-125 (354-33-6) : Practically non toxic (rat) 4 LC<sub>50</sub> > 3,900 mg/l(~800000 ppm)

HFC-143a (420-46-2): Practically non toxic (rat) 4 h LCD>540,000 PPM

HFC-134a (811-97-2) : Practically non toxic (rat) 4 LC<sub>50</sub> approx. 2,360 mg/l(~567000 ppm)

### **Delayed (Subchronic & chronic effects) :**

HFC-125: Teratogenic NOEL (rat and rabbit) – 50,000 ppm

Subchronic inhalation (rat) NOEL -  $\geq 50,000$  ppm  
Chronic NOEL - 10,000 ppm

HFC-143a : Teratogenic NOEL (rat and rabbit) - 50,000 ppm  
Subchronic inhalation (rat) NOEL -  $\geq 50,000$  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-134a, HFC-125 : Not active in four genetic studies

HFC 143a : Not active in two genetic studies.

**11) ECOLOGICAL INFORMATION**

**HFC - 125 (354-33-6)**

**Biodegradation:**

Not readily biodegradable. (Closed Bottle test, 28 d) biodegradation 5 %

**Octanol Water Partition Coefficient:**

log Pow = 1.48

**Global Warming Potential:**

GWP 0.84 (Halocarbon global warming potential; HGWP; (R-11 = 1))

**Ozone Depletion Potential:**

ODP < 0.001 (Ozone depletion potential; ODP; (R-11 = 1))

**HFC - 143a (420-46-2)**

**Octanol Water Partition Coefficient :**

Low Pow = 1.73 (calculated)

**Global Warming Potential:**

GWP = 3,800 (Global warming potential with respect to CO<sub>2</sub> (time horizon 100 years))

**Ozone Depletion Potential:**

ODP = 0 (Ozone depletion potential; ODP; (R-11 = 1))

**HFC - 134a (811-97-2)**

**Biodegradation:**

Not readily biodegradable. (28 d) biodegradation 3 %

**Octanol Water Partition Coefficient:**

log Pow = 1.06

**Photodegradation:**

Degradation in the atmosphere Half-life direct photolysis: = 9.6 - 16.7 y  
(in atmosphere)

**Global Warming Potential:**

GWP = 0.3 (Halocarbon global warming potential.)

**Ozone Depletion Potential:**

ODP = 0

**12) DISPOSAL CONSIDERATIONS**

**Waste disposal:**

Do not vent the container contents, or product residuals, to the atmosphere. Recover and reclaim unused contents or residuals as appropriate. Recovered/reclaimed product can be returned to an approved certified reclaimer or back to the seller depending on the material. Completely emptied disposable containers can be disposed of as recyclable steel. Returnable cylinders must be returned to seller. Dispose of in accordance with federal, state and local regulations. Consult a regulatory specialist to determine appropriate state or local reporting requirements, for assistance in waste characterization and/or hazardous waste disposal and other requirements listed in pertinent environmental permits. 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 federal laws and regulations.

**13) TRANSPORT**

**International Maritime Dangerous Goods Code (IMDG)**

UN Number : 3337

Proper shipping name : REFRIGERANT GAS R 404A

Class : 2.2

Marine pollutant : No

**14) REGULATORY INFORMATION**

**Chemical Inventory Status**

- EU. EINECS EINECS Conforms to
- US. Toxic Substances Control Act TSCA The components of this product are all on the TSCA Inventory.
- Australia. Industrial Chemical (Notification and Assessment) Act AICS Conforms to
- Canada. Canadian Environmental Protection Act (CEPA). Domestic Substances List (DSL). (Can. Gaz.Part II, Vol. 144). DSL All components of this product are on the

Canadian DSL list.

- Japan. Kashin-Hou Law List ENCS (JP) Conforms to
- Korea. Existing Chemicals Inventory (KECI) KECI (KR) Conforms to
- Philippines. The Toxic Substances and Hazardous and Nuclear Waste Control Act PICCS (PH) Conforms to
- China. Inventory of Existing Chemical Substances IECSC (CN) Conforms to
- New Zealand. Inventory of Chemicals (NZIoC), as published by ERMA New Zealand NZIOC Conforms to

## **15) OTHER INFORMATION**

**Current issue date :** December, 2011

### **Other information :**

HMIS Classification: Health – 1, Flammability – 1, Reactivity – 0

NFPA Classification: Health – 2, Flammability – 1, Reactivity – 0

ANSI / ASHRAE 34 Safety Group – A1

## **16) DISCLAIMER**

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