SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Genetron® 134a
MSDS Number	:	000000009876
Product Use Description	:	Refrigerant, Propellant
Company	:	Honeywell International, Inc. 101 Columbia Road Morristown, NJ 07962-1057
For more information call	:	800-522-8001 (Monday-Friday, 9:00am-5:00pm)
In case of emergency call	:	**Medical: 1-800-498-5701**
	:	**Transportation: 1-800-424-9300 or 703-527-3887**
	:	(24 hours/day, 7 days/week)

SECTION 2. HAZARDS IDENTIFICATION

Emergency Overview

Form	:	Liquefied gas
Color	:	colourless
Odor	:	weak
Hazard Summary	:	Warning! Container under pressure. This product is not flammable at ambient temperatures and atmospheric pressure. Gas reduces oxygen available for breathing. Causes asphyxiation in high concentrations. The victim will not realize that he/she is suffocating. Inhalation may cause central nervous system effects. May cause cardiac arrhythmia. May cause drowsiness and dizziness. Do not breathe vapour. Irritating to eyes and skin. Avoid contact with skin, eyes and clothing. At higher temperatures, (>250 C), decomposition products may include hydrofluoric acid (HF) and carbonyl halides. The ACGIH Threshold Limit Values (2007) for Hydrogen Fluoride are TLV-TWA 0.5 ppm and Ceiling Exposure Limit 2 ppm.

Potential Health Effects

Skin	:	Avoid skin contact with leaking liquid (danger of frostbite). May cause frostbite. Irritating to skin.
Eyes	:	Causes severe eye irritation. May cause frostbite.
Ingestion	:	Unlikely route of exposure.

Effects due to ingestion may include:
Gastrointestinal discomfort

Inhalation : Gas reduces oxygen available for breathing.
Causes asphyxiation in high concentrations. The victim will not realize that he/she is suffocating.
Inhalation may cause central nervous system effects.
May cause cardiac arrhythmia.
Vapours may cause drowsiness and dizziness.

Chronic Exposure : None known.

Carcinogenicity

No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP, IARC, or OSHA.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Weight %
Norflurane	811-97-2	100.00

SECTION 4. FIRST AID MEASURES

Inhalation : Move to fresh air. If breathing is irregular or stopped, administer artificial respiration. Use oxygen as required, provided a qualified operator is present. Call a physician. Do not give drugs from adrenaline-ephedrine group.

Skin contact : After contact with skin, wash immediately with plenty of water. 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. If symptoms persist, call a physician.

Eye contact : Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. In case of frostbite water should be lukewarm, not hot. If symptoms persist, call a physician.

Ingestion : Unlikely route of exposure. As this product is a gas, refer to the inhalation section. Do not induce vomiting without medical advice. Call a physician immediately.

Notes to physician

Treatment : 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. Treat frost-bitten areas as

needed.

SECTION 5. FIRE-FIGHTING MEASURES

Flash point	:	not applicable
Ignition temperature	:	>750 °C (1,382 °F)
Lower explosion limit	:	None
Upper explosion limit	:	None
Suitable extinguishing media	:	The product is not flammable. Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Specific hazards during fire fighting	:	Contents under pressure. This product is not flammable at ambient temperatures and atmospheric pressure. However, this material can ignite when mixed with air under pressure and exposed to strong ignition sources. Container may rupture on heating. Cool closed containers exposed to fire with water spray. Do not allow run-off from fire fighting to enter drains or water courses. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. In case of fire hazardous decomposition products may be produced such as: Hydrogen halides Hydrogen fluoride Carbon monoxide Carbon dioxide (CO2) Carbonyl halides
Special protective equipment for fire-fighters	:	In the event of fire and/or explosion do not breathe fumes. Wear self-contained breathing apparatus and protective suit. No unprotected exposed skin areas.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions	:	Immediately evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Wear personal protective equipment. Unprotected persons must be kept away. Remove all sources of ignition. Avoid skin contact with leaking liquid (danger of frostbite). Ventilate the area. After release, disperses into the air.

Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.
Avoid accumulation of vapours in low areas.
Unprotected personnel should not return until air has been tested and determined safe.
Ensure that the oxygen content is >= 19.5%.

Environmental precautions : Prevent further leakage or spillage if safe to do so.
The product evaporates readily.

Methods for cleaning up : Ventilate the area.

SECTION 7. HANDLING AND STORAGE

Handling

Handling : Handle with care.
Avoid inhalation of vapour or mist.
Do not get in eyes, on skin, or on clothing.
Wear personal protective equipment.
Use only in well-ventilated areas.
Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50 °C.
Follow all standard safety precautions for handling and use of compressed gas cylinders.
Use authorized cylinders only.
Protect cylinders from physical damage.
Do not puncture or drop cylinders, expose them to open flame or excessive heat.
Do not pierce or burn, even after use. Do not spray on a naked flame or any incandescent material.
Do not remove screw cap until immediately ready for use.
Always replace cap after use.

Advice on protection against fire and explosion : The product is not flammable.
Can form a combustible mixture with air at pressures above atmospheric pressure.

Storage

Requirements for storage areas and containers : Pressurized container: Protect from sunlight and do not expose to temperatures exceeding 50°C. Do not pierce or burn, even after use.
Keep containers tightly closed in a dry, cool and well-ventilated place.
Storage rooms must be properly ventilated.
Ensure adequate ventilation, especially in confined areas.
Protect cylinders from physical damage.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Protective measures	:	Do not breathe vapour. Avoid contact with skin, eyes and clothing. Ensure that eyewash stations and safety showers are close to the workstation location.
Engineering measures	:	General room ventilation is adequate for storage and handling. Perform filling operations only at stations with exhaust ventilation facilities.
Eye protection	:	Wear as appropriate: Safety glasses with side-shields If splashes are likely to occur, wear: Goggles or face shield, giving complete protection to eyes
Hand protection	:	Leather gloves In case of contact through splashing: Protective gloves Neoprene gloves Polyvinyl alcohol or nitrile- butyl-rubber gloves
Skin and body protection	:	Avoid skin contact with leaking liquid (danger of frostbite). Wear cold insulating gloves/face shield/eye protection.
Respiratory protection	:	In case of insufficient ventilation, wear suitable respiratory equipment. Wear a positive-pressure supplied-air respirator. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. For rescue and maintenance work in storage tanks use self-contained breathing apparatus.
Hygiene measures	:	Handle in accordance with good industrial hygiene and safety practice. Ensure adequate ventilation, especially in confined areas. Avoid contact with skin, eyes and clothing. Remove and wash contaminated clothing before re-use. Keep working clothes separately.

Exposure Guidelines

1,1,1,2-Tetrafluoroethane	811-97-2	WEEL	TWA	1,000 ppm	4,240 mg/m3
		HONEYWELL	TWA		1,000 ppm

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Form	:	Liquefied gas
Color	:	colourless
Odor	:	weak

Molecular Weight	:	102.02 g/mol
pH	:	neutral
Melting point/range	:	-101 °C (-150 °F)
Boiling point/boiling range	:	-26.2 °C (-15.2 °F)
Vapor pressure	:	5,915 hPa at 21.1 °C (70.0 °F)
Vapor pressure	:	14,713 hPa at 54.4 °C (129.9 °F)
Relative vapour density	:	3.5
Density	:	1.2 g/cm3
Water solubility	:	1.5 g/l
Partition coefficient: n-octanol/water	:	log Pow: 1.06 The product is more soluble in octanol.

SECTION 10. STABILITY AND REACTIVITY

Conditions to avoid	:	Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50 °C. Decomposes under high temperature. Some risk may be expected of corrosive and toxic decomposition products. Can form a combustible mixture with air at pressures above atmospheric pressure. Do not mix with oxygen or air above atmospheric pressure.
Materials to avoid	:	Finely divided aluminium Potassium Calcium Powdered metals Aluminium Magnesium Zinc
Hazardous decomposition products	:	Halogenated compounds Hydrogen fluoride Carbonyl halides Carbon oxides
Thermal decomposition	:	>250 °C To avoid thermal decomposition, do not overheat.
Hazardous reactions	:	Hazardous polymerisation does not occur. Stable under normal conditions.

SECTION 11. TOXICOLOGICAL INFORMATION

Acute inhalation toxicity	:	LC50 rat Dose: > 500000 ppm Exposure time: 4 h
Repeated dose toxicity	:	rat NOEL: 40000 ppm
Additional advice	:	Acute Health Hazard 1,1,1,2-tetrafluoroethane (HFC-134a): Cardiac sensitisation threshold (dog): 80000 ppm. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. Irritating to eyes and skin. Rapid evaporation of the liquid may cause frostbite. Avoid skin contact with leaking liquid (danger of frostbite). May cause cardiac arrhythmia. Chronic Health Hazard In vitro tests did not show mutagenic effects In vivo tests did not show mutagenic effects

SECTION 12. ECOLOGICAL INFORMATION

Additional ecological information	:	Accumulation in aquatic organisms is unlikely. This product contains 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.

SECTION 13. DISPOSAL CONSIDERATIONS

Waste Information: Avoid contact of spilled material and runoff with soil and surface waterways. Consult an environmental professional to determine if local, regional or national regulations would classify spilled or contaminated materials as hazardous waste. Use only approved transporters, recyclers, treatment, storage or disposal facilities. Dispose of according to all federal, state and local applicable regulations.

Other Disposal Considerations: Observe all Federal, State, and Local Environmental regulations.

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.

Additional advice	:	This product is subject to U.S. Environmental Protection Agency Clean Air Act Regulations Section 608 in 40 CFR Part 82 regarding refrigerant recycling.

SECTION 14. TRANSPORT INFORMATION

DOT	Proper shipping name	:	1,1,1,2-TETRAFLUOROETHANE
	UN-Number	:	3159
	Class	:	2.2
	Packing group	:	
IATA	UN Number	:	3159
	Description of the goods	:	1,1,1,2-TETRAFLUOROETHANE
	Class	:	2.2
	Hazard Label	:	2.2
	Packing instruction (cargo aircraft)	:	200
	Packing instruction (passenger aircraft)	:	200
IMDG	Substance No.	:	UN 3159
	Description of the goods	:	1,1,1,2-TETRAFLUOROETHANE
	Class	:	2.2
	Hazard Label	:	2.2
	EmS Number	:	F-C
	Marine pollutant	:	no

SECTION 15. REGULATORY INFORMATION

Inventories

EU. EINECS	:	On or in compliance with the inventory
US. Toxic Substances Control Act	:	On TSCA Inventory
Australia. AICS	:	On or in compliance with the inventory
Canada. Canadian Environmental Protection Act (CEPA). Domestic Substances List (DSL). (Can. Gaz. Part II, Vol. 133)	:	All components of this product are on the Canadian DSL list.
Japan. ENCS	:	On or in compliance with the inventory
Korea. KECI	:	On or in compliance with the inventory
Philippines. PICCS	:	On or in compliance with the inventory
China. IECSC	:	On or in compliance with the inventory
New Zealand. Interim Inventory of Chemicals (as	:	On or in compliance with the inventory

published by ERMA new Zealand)

TSCA 12B	:	US. Toxic Substances Control Act (TSCA) Section 12(b) Export Notification (40 CFR 707, Subpt D)	
		1,1,1,2-Tetrafluoroethane	811-97-2

National regulatory information

SARA 311/312 Hazards	:	Acute Health Hazard Sudden Release of Pressure Hazard	
California Prop. 65	:	This product does not contain any chemicals known to State of California to cause cancer, birth, or any other reproductive defects.	
New Jersey RTK	:	1,1,1,2-Tetrafluoroethane	811-97-2
Pennsylvania RTK	:	1,1,1,2-Tetrafluoroethane	811-97-2
WHMIS Classification	:	A	
Global warming potential	:	1,300	
Ozone depletion potential (ODP)	:	0	

SECTION 16. OTHER INFORMATION

		HMIS III	**NFPA**
Health Hazard	:	1	2
Flammability	:	1	1
Physical Hazard	:	0	
Instability	:		0