SECTION 1. IDENTIFICATION

Product name	:	Genetron Performax® LT (R-407F)
Number	:	000000013866
Product Use Description	:	Refrigerant
Manufacturer or supplier's details	:	Honeywell International Inc. 115 Tabor Road Morris Plains, NJ 07950-2546
For more information call	:	800-522-8001 +1-973-455-6300 (Monday-Friday, 9:00am-5:00pm)
In case of emergency call	:	**Medical: 1-800-498-5701 or +1-303-389-1414**
	:	**Transportation (CHEMTREC): 1-800-424-9300 or +1-703-527-3887**
	:	
	:	(24 hours/day, 7 days/week)

SECTION 2. HAZARDS IDENTIFICATION

Emergency Overview

Form	:	Liquefied gas
Color	:	clear and colourless
Odor	:	ether-like

Classification of the substance or mixture

Classification of the substance or mixture	:	Gases under pressure, Liquefied gas Simple Asphyxiant

GHS Label elements, including precautionary statements

Symbol(s) :

Signal word	:	Warning
Hazard statements	:	Contains gas under pressure; may explode if heated. May displace oxygen and cause rapid suffocation.
Precautionary statements	:	**Storage:** Protect from sunlight. Store in a well-ventilated place.
Hazards not otherwise classified	:	May cause frostbite. May cause cardiac arrhythmia. May cause eye and skin irritation.

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

Synonyms	:	Mixture of 1,1,1,2-Tetrafluoroethane, Pentafluoroethane and Difluoromethane
Chemical nature	:	Mixture

Chemical name	CAS-No.	Concentration

1,1,1,2-Tetrafluoroethane	811-97-2	40.00 %
Difluoromethane	75-10-5	30.00 %
Pentafluoroethane	354-33-6	30.00 %

SECTION 4. FIRST AID MEASURES

General advice : First aider needs to protect himself. Move out of dangerous area. Take off all contaminated clothing immediately.

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

Indication of immediate medical attention and special treatment needed, if necessary : 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. FIREFIGHTING MEASURES

Suitable extinguishing media	:	The product is not flammable. ASHRAE 34 Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
Specific hazards during firefighting	:	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. Contents under pressure. Container may rupture on heating. Cool closed containers exposed to fire with water spray. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. Fire may cause evolution of: Hydrogen fluoride Carbon oxides Halogenated compounds Carbonyl halides
Special protective equipment for firefighters	:	Wear self-contained breathing apparatus and protective suit.
Further information	:	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Wear personal protective equipment. Immediately evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. 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 evapourates readily.
Methods and materials for containment and cleaning up	:	Ventilate the area.

SECTION 7. HANDLING AND STORAGE

Handling

Precautions for safe handling	:	Wear personal protective equipment. Do not breathe vapour. Avoid contact with skin, eyes and clothing. Follow all standard safety precautions for handling and use of compressed gas cylinders. Keep away from heat. 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

Conditions for safe storage, including any incompatibilities	:	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.
Do not get in eyes, on skin, or on clothing.
Remove and wash contaminated clothing before re-use.
Keep working clothes separately.

Exposure Guidelines

Components	CAS-No.	Value	Control parameters	Update	Basis
1,1,1,2-Tetrafluoroethane	811-97-2	TWA : Time weighted average	(1,000 ppm)		Honeywell:Limit established by Honeywell International Inc.
1,1,1,2-Tetrafluoroethane	811-97-2	TWA : Time weighted average	4,240 mg/m3 (1,000 ppm)	2007	WEEL:US. OARS. WEELs Workplace Environmental Exposure Level Guide
Pentafluoroethane	354-33-6	TWA : Time weighted average	4,900 mg/m3 (1,000 ppm)	2007	WEEL:US. OARS. WEELs Workplace Environmental Exposure Level Guide
Pentafluoroethane	354-33-6	TWA : Time weighted average	(1,000 ppm)		Honeywell:Limit established by Honeywell International Inc.
Difluoromethane	75-10-5	TWA : Time weighted average	2,200 mg/m3 (1,000 ppm)	2007	WEEL:US. OARS. WEELs Workplace Environmental Exposure Level Guide

Difluoromethane	75-10-5	TWA : Time weighted average	(1,000 ppm)	1994	Honeywell:Limit established by Honeywell International Inc.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state	:	Liquefied gas
Color	:	clear and colourless
Odor	:	ether-like
pH	:	Note: neutral
Boiling point/boiling range	:	-45.5 °C at 1,013 hPa
Flash point	:	Note: Not applicable
Lower explosion limit	:	Note: None
Upper explosion limit	:	Note: None
Vapor pressure	:	10,218 hPa at 21.1 °C(70.0 °F) 24,621 hPa at 54.4 °C(129.9 °F)
Vapor density	:	Note: not determined
Density	:	Note: not determined

Partition coefficient: n-octanol/water	:	log Pow: 1.06 Note: 1,1,1,2-tetrafluoroethane (HFC-134a) log Pow: 1.48 Note: Ethane, pentafluoro- (HFC-125)
Ignition temperature	:	Note: no data available

SECTION 10. STABILITY AND REACTIVITY

Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	Hazardous polymerisation does not occur.
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.
Incompatible materials	:	Potassium Calcium Powdered metals Finely divided aluminium Finely divided magnesium Zinc
Hazardous decomposition products	:	Halogenated compounds Hydrogen fluoride Carbonyl halides Carbon oxides

SECTION 11. TOXICOLOGICAL INFORMATION

Acute inhalation toxicity

1,1,1,2-Tetrafluoroethane	:	LC50: > 500000 ppm Exposure time: 4 h Species: Rat
Difluoromethane	:	LC50: > 520000 ppm Exposure time: 4 h Species: Rat
Pentafluoroethane	:	> 769000 ppm Exposure time: 4 h Species: Rat

Sensitisation

1,1,1,2-Tetrafluoroethane	:	Cardiac sensitization Species: dogs Note: No-observed-effect level 50 000 ppm Lowest observed effect level 75 000 ppm
Difluoromethane	:	Cardiac sensitization Species: dogs Note: No-observed-effect level >350 000 ppm
Pentafluoroethane	:	Cardiac sensitization Species: dogs Note: No-observed-effect level 75 000 ppm Lowest observed effect level 100 000 ppm

Repeated dose toxicity

1,1,1,2-Tetrafluoroethane	:	Species: Rat NOEL: 40000 ppm
Difluoromethane	:	Species: Rat Application Route: Inhalation Exposure time: (90 d) NOEL: 50000 ppm Subchronic toxicity
Pentafluoroethane	:	Species: Rat Application Route: Inhalation Exposure time: (4 Weeks) NOEL: 50000 ppm Subchronic toxicity

Genotoxicity in vitro

1,1,1,2-Tetrafluoroethane	:	Note: In vitro tests did not show mutagenic effects
Difluoromethane	:	Test Method: Ames test Result: negative
Pentafluoroethane	:	Test Method: Ames test Result: negative
	:	Cell type: Human lymphocytes Result: negative Method: Mutagenicity (in vitro mammalian cytogenetic test)
	:	Test Method: Chromosome aberration test in vitro Result: negative
	:	Cell type: Human lymphocytes Result: negative
	:	Cell type: Chinese Hamster Ovary Cells Result: negative

Genotoxicity in vivo

Difluoromethane	:	Species: Mouse Cell type: Bone marrow Method: Mutagenicity (micronucleus test) Result: negative

Teratogenicity

Difluoromethane : Species: Rat
Dose: NOEL - 50,000 ppm
Note: Did not show teratogenic effects in animal experiments.

Species: Rabbit
Dose: NOEL - 50,000 ppm
Note: Did not show teratogenic effects in animal experiments.

Pentafluoroethane : Species: Rabbit
Application Route: Inhalation exposure
NOAEL,Teratog: 50,000 ppm
NOAEL,Maternal: 50,000 ppm
Note: Did not show teratogenic effects in animal experiments.

Species: Rat
Application Route: Inhalation exposure
NOAEL,Teratog: 50,000 ppm
NOAEL,Maternal: 50,000 ppm
Note: Did not show teratogenic effects in animal experiments.

Further information : Note: Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. Rapid evaporation of the liquid may cause frostbite. May cause cardiac arrhythmia.

SECTION 12. ECOLOGICAL INFORMATION

Biodegradability

Difluoromethane : Note: Minimal

Pentafluoroethane : Result: Not readily biodegradable.
Value: 5 %
Method: OECD 301 D

Further information on ecology

Additional ecological information	:	This product is subject to U.S. Environmental Protection Agency Clean Air Act Regulations at 40 CFR Part 82. 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

Disposal methods	:	Observe all Federal, State, and Local Environmental regulations.
Note	:	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	UN/ID No.	:	UN 3163
	Proper shipping name	:	LIQUEFIED GAS, N.O.S. (1,1,1,2-Tetrafluoroethane, Difluoromethane, Pentafluoroethane)
	Class		2.2
	Packing group		
	Hazard Labels		2.2
IATA	UN/ID No.	:	UN 3163
	Description of the goods	:	LIQUEFIED GAS, N.O.S. (1,1,1,2-Tetrafluoroethane, Difluoromethane, Pentafluoroethane)
	Class	:	2.2
	Hazard Labels	:	2.2
	Packing instruction (cargo aircraft)	:	200
	Packing instruction (passenger aircraft)	:	200

IMDG	UN/ID No.	:	UN 3163
	Description of the goods	:	LIQUEFIED GAS, N.O.S. (1,1,1,2-TETRAFLUOROETHANE, DIFLUOROMETHANE, PENTAFLUOROETHANE)
	Class	:	2.2
	Hazard Labels	:	2.2
	EmS Number	:	F-C, S-V
	Marine pollutant	:	no

SECTION 15. REGULATORY INFORMATION

Inventories

US. Toxic Substances Control Act	:	On TSCA Inventory
Australia. Industrial Chemical (Notification and Assessment) Act	:	On the inventory, or in compliance with the inventory
Canada. Canadian Environmental Protection Act (CEPA). Domestic Substances List (DSL)	:	All components of this product are on the Canadian DSL
Japan. Kashin-Hou Law List	:	On the inventory, or in compliance with the inventory
Korea. Existing Chemicals Inventory (KECI)	:	On the inventory, or in compliance with the inventory
Philippines. The Toxic Substances and Hazardous and Nuclear Waste Control Act	:	On the inventory, or in compliance with the inventory
China. Inventory of Existing Chemical Substances	:	On the inventory, or in compliance with the inventory
New Zealand. Inventory of Chemicals (NZIoC), as published by ERMA New	:	On the inventory, or in compliance with the inventory

Zealand

National regulatory information

SARA 302 Components	:	No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.
SARA 313 Components	:	This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.
SARA 311/312 Hazards	:	Sudden Release of Pressure Hazard Acute Health Hazard
California Prop. 65	:	**WARNING:**This product can expose you to chemicals, listed below, known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov. Dichloromethane 75-09-2 Chloromethane 74-87-3
Massachusetts RTK	:	Dichloromethane 75-09-2
New Jersey RTK	:	Difluoromethane 75-10-5
Pennsylvania RTK	:	Difluoromethane 75-10-5

SECTION 16. OTHER INFORMATION

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

Hazard rating and rating systems (e.g. HMIS® III, NFPA): This information is intended solely for the use of individuals trained in the particular system.

Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text. Final determination of suitability of any material is the sole responsibility of the user. This information should not constitute a guarantee for any specific product properties.

Changes since the last version are highlighted in the margin. This version replaces all previous versions.
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