

SAFETY DATA SHEET

Honeywell

Sid Harvey Part # R407FX115 & R407FX25

SDS # Z0485

Genetron Performax® LT (R-407F)

10329614

Version 2.0

Revision Date 08/22/2018

Print Date 08/23/2018

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

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Classification of the substance or mixture

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

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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

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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

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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 $\geq 19.5\%$.

Environmental precautions : Prevent further leakage or spillage if safe to do so.
The product evaporates 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 : The product is not flammable.

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fire and explosion

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.

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- 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

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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

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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

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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

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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

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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

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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.

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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	: 2.2
IATA	Hazard Labels	: 2.2
	UN/ID No.	: UN 3163
	Description of the goods	: LIQUEFIED GAS, N.O.S. (1,1,1,2-Tetrafluoroethane, Difluoromethane, Pentafluoroethane)
	Class	: 2.2
IMDG	Hazard Labels	: 2.2
	Packing instruction (cargo aircraft)	: 200
	Packing instruction (passenger aircraft)	: 200
	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 : On TSCA Inventory
Control Act

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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 Zealand : On the inventory, or in compliance with the inventory

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

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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
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New Jersey RTK	:	Difluoromethane	75-10-5
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Pennsylvania RTK	:	Difluoromethane	75-10-5
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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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Previous Issue Date: 09/28/2015

Prepared by Honeywell Performance Materials and Technologies Product Stewardship Group

SAFETY DATA SHEET

Honeywell

Sid Harvey item # R407FX25, R407FX115

SDS# Z0485

Genetron Performax LT 11.3kg/25lb Cyl

000000013866

Version 1.6

Revision Date 09/28/2015

Print Date 05/24/2018

SECTION 1. PRODUCT AND COMPANY 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) :



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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

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

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(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. 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.
In case of fire hazardous decomposition products may be produced such as:
Hydrogen fluoride
Carbon monoxide
Carbon dioxide (CO₂)
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.

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SECTION 6. ACCIDENTAL RELEASE MEASURES

- Personal precautions : 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 $\geq 19.5\%$.
- 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 : 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

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Version 1.6

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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.
Do not get in eyes, on skin, or on clothing.
Remove and wash contaminated clothing before re-use.
Keep working clothes separately.

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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	(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

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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.

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Do not mix with oxygen or air above atmospheric pressure.

Incompatible materials to avoid : Potassium
Calcium
Powdered metals
Finely divided aluminium
Finely divided magnesium
Zinc

Hazardous decomposition products : In case of fire hazardous decomposition products may be produced such as:
Gaseous hydrogen fluoride (HF).
Carbonyl halides
Carbon monoxide
Carbon dioxide (CO₂)

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

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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

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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.

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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

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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. Toxic Chemical Control Law (TCCL) List : 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 Zealand : On the inventory, or in compliance with the inventory

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

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California Prop. 65

: WARNING! This product contains a chemical known to the State of California to cause cancer.

Dichloromethane

75-09-2

: WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

Chloromethane

74-87-3

Massachusetts RTK

: Dichloromethane

75-09-2

New Jersey RTK

: Difluoromethane

75-10-5

Pennsylvania RTK

: Difluoromethane

75-10-5

WHMIS Classification

: A: Compressed Gas

This product has been classified according to the hazard criteria of the CPR and the MSDS contains all of the information required by the CPR.

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

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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.

Previous Issue Date: 06/04/2014

Prepared by Honeywell Performance Materials and Technologies Product Stewardship Group

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006

Honeywell

Sid Harvey item # R407FX25

SDS # Z0485

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Supersedes 1

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product name : Genetron Performax® LT (R-407F)
SDS-number : 000000013866
Type of product : Mixture
Remarks : SDS according to Art. 31 of Regulation (EC) 1907/2006.

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the Substance/Mixture : Refrigerant
Uses advised against : none

1.3. Details of the supplier of the safety data sheet

Company : Honeywell Fluorine Products Europe B.V.
Laarderhoogtweg 18
1101 EA Amsterdam
Netherlands
Telephone : (31) 020 5656911
Telefax : (31) 020 5656600
For further information, please contact: PMTEU Product Stewardship:
SafetyDataSheet@Honeywell.com
Honeywell International, Inc.
115 Tabor Road
Morris Plains, NJ 07950-2546
USA

1.4. Emergency telephone number

Emergency telephone number : (32) 16 391 209 (Mon-Fri, 9.00-17.00h)
3887 (ChemTrec)
+1-303-389-1414 (Medical) +1-703-527-

SECTION 2: Hazards identification


2.1. Classification of the substance or mixture

REGULATION (EC) No 1272/2008

Gases under pressure Liquefied gas
H280 Contains gas under pressure; may explode if heated.

2.2. Label elements

REGULATION (EC) No 1272/2008

Hazard pictograms : 

Signal word : Warning

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Hazard statements	: H280	Contains gas under pressure; may explode if heated.
Precautionary statements	: P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
	P280	Wear protective gloves/ eye protection/ face protection.
	P284	In case of inadequate ventilation wear respiratory protection.
	P308 + P313	IF exposed or concerned: Get medical advice/ attention.
	P410 + P403	Protect from sunlight. Store in a well-ventilated place.

2.3. Other hazards

Contains gas under pressure; may explode if heated.

SECTION 3: Composition/information on ingredients

3.1. Substance

Not applicable

3.2. Mixture

Chemical Name	CAS-No. Index-No. Registration number EC-No.	Classification 1272/2008	Concentration	Remarks
Norflurane (Active ingredient)	811-97-2 01-2119459374-33 212-377-0	Press. Gas ; H280	>= 25 - < 50	1*
Pentafluoroethane (Active ingredient)	354-33-6 01-2119485636-25 206-557-8	Press. Gas ; H280	>= 25 - < 50	1*
Difluoromethane (Active ingredient)	75-10-5 01-2119471312-47 200-839-4	Flam. Gas 1; H220 Press. Gas ; H280	>= 25 - <= 50	1*

1* - For specific concentration limits see Annexes of 1272/2008

Remaining components of this product are non-hazardous and/or are present at concentrations below reportable limits.

Occupational Exposure Limit(s), if available, are listed in Section 8.

For the full text of the H-Statements mentioned in this Section, see Section 16.

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SECTION 4: First aid measures

4.1 Description of first aid measures

Inhalation:

Remove to fresh air. Artificial respiration and/or oxygen may be necessary. Call a physician immediately.

Skin contact:

Rapid evaporation of the liquid may cause frostbite. In case of contact with liquid, thaw frosted parts with water, then remove clothing carefully. Wash with plenty of water. Consult a physician. Take off contaminated clothing and shoes immediately. Wash contaminated clothing before re-use.

Eye contact:

Remove contact lenses. Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.

Ingestion:

Ingestion is unlikely because of the physical properties and is not expected to be hazardous.

4.2. Most important symptoms and effects, both acute and delayed

no data available

4.3. Indication of any immediate medical attention and special treatment needed

Do not give adrenaline or similar drugs.

See Section 11 for more detailed information on health effects and symptoms.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media:

The product is not flammable.

ASHRAE 34

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2. Special hazards arising from the substance or mixture

Possibility of generating hazardous reactions during a fire due to the presence of F and Cl groups.

Heating will cause pressure rise with risk of bursting

Cool closed containers exposed to fire with water spray.

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.

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5.3. Advice for firefighters

Wear full protective clothing and self-contained breathing apparatus.

Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

SECTION 6: Accidental release measures**6.1. Personal precautions, protective equipment and emergency procedures**

Immediately contact emergency personnel. Wear personal protective equipment. Unprotected persons must be kept away. Ensure adequate ventilation. In case of insufficient ventilation wear suitable respiratory equipment.

6.2. Environmental precautions

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

6.3. Methods and materials for containment and cleaning up

Ventilate the area.

6.4. Reference to other sections

For personal protection see section 8.

SECTION 7: Handling and storage**7.1. Precautions for safe handling**

Advice on safe handling:

Open drum carefully as content may be under pressure. The product should only be used in areas from which all naked lights and other sources of ignition have been excluded. Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50 °C. Do not pierce or burn, even after use. Do not spray on a naked flame or any incandescent material. Do not use in areas without adequate ventilation. Contaminated equipment (brushes, rags) must be cleaned immediately with water.

Hygiene measures:

Provide adequate ventilation. When using do not eat or drink.

7.2. Conditions for safe storage, including any incompatibilities

Further information on storage conditions:

Store in original container. Keep away from direct sunlight. Keep containers tightly closed in a cool, well-ventilated place.

7.3. Specific end use(s)

no additional data available

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SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limits:

Components	Basis / Value type	Value / Form of exposure	Exceeding Factor	Remarks
Norflurane	HONEYWELL TWA	1.000 ppm		
Norflurane	EH40 WEL TWA	4.240 mg/m3 1.000 ppm		
Pentafluoroethane	HONEYWELL TWA	1.000 ppm		We are not aware of any national exposure limit.

TWA - Time weighted average

DNEL/ PNEC-Values

Component	End-use / Impact	Exposure duration	Value	Exposure routes	Remarks
Norflurane	Workers / Long-term systemic effects		13936 mg/m3	Inhalation	
Norflurane	Consumers / Long-term systemic effects		2476 mg/m3	Inhalation	
Difluoromethane	Workers / Long-term systemic effects		7035 mg/m3	Inhalation	
Difluoromethane	Consumers / Long-term systemic effects		750 mg/m3	Inhalation	
Pentafluoroethane	Workers / Long-term systemic effects		16444 mg/m3	Inhalation	
Pentafluoroethane	Consumers / Long-term systemic effects		1753 mg/m3	Inhalation	

Component	Environmental compartment / Value	Remarks
Norflurane	Fresh water: 0,1 mg/l	Assessment factor: 1000

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Norflurane	Marine water: 0,01 mg/l	Assessment factor: 10000
Norflurane	Fresh water sediment: 0,75 mg/kg	Assessment factor: 100
Norflurane	Sewage treatment plant: 73 mg/l	Assessment factor: 10
Difluoromethane	Fresh water: 0,142 mg/l	Assessment factor: 1000
Difluoromethane	Fresh water sediment: 0,534 mg/kg dw	
Pentafluoroethane	Fresh water: 0,1 mg/l	Assessment factor: 1000
Pentafluoroethane	Fresh water sediment: 0,6 mg/kg dw	

8.2. Exposure controls

Occupational exposure controls

The Personal Protective Equipment must be in accordance with EN standards:respirator EN 136, 140, 149; safety glasses EN 166; protective suit: EN 340, 463, 468, 943-1, 943-2; gloves EN 374, safety shoes EN-ISO 20345.

Personal protective equipment

Respiratory protection:

In case of insufficient ventilation wear suitable respiratory equipment.
Self-contained breathing apparatus (EN 133)

Hand protection:

Protective gloves against cold
(EN 511)

Eye protection:

Safety glasses with side-shields conforming to EN166
Face-shield

Skin and body protection:

Protective footwear

Environmental exposure controls

Handle in accordance with local environmental regulations and good industrial practices.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Form : Liquefied gas

Colour : clear
and

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	colourless
Odour	: ether-like
	: no data available
Boiling point/boiling range	: -45,5 °C at 1.013 hPa
Ignition temperature	: no data available
Lower explosion limit	: None
Upper explosion limit	: None
Vapour pressure	: 10.218 hPa at 21,1 °C
Density	: no data available
pH	: neutral
Water solubility	: no data available
Partition coefficient: n-octanol/water	: log Pow 1,06 1,1,1,2-tetrafluoroethane (HFC-134a)
Partition coefficient: n-octanol/water	: log Pow 1,48 Ethane, pentafluoro- (HFC-125)
Relative vapour density	: not determined

9.2 Other Information

no additional data available

SECTION 10: Stability and reactivity

10.1. Reactivity

Stable under normal conditions.
Hazardous polymerisation does not occur.

10.2. Chemical stability

no data available

10.3. Possibility of hazardous reactions

no data available

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10.4. Conditions to avoid

Heating will cause pressure rise with risk of bursting
Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50 °C.
Do not pierce or burn, even after use. Do not spray on a naked flame or any incandescent material.

10.5. Incompatible materials

oxidising substances
Possible incompatibility with alkali sensitive materials.
Powdered metals

10.6. Hazardous decomposition products

Halogenated compounds
Hydrogen fluoride
Carbonyl halides
Carbon oxides

SECTION 11: Toxicological information**11.1. Information on toxicological effects**

Acute oral toxicity:
no data available

Acute dermal toxicity:
no data available

Acute inhalation toxicity:
LC50
Species: Rat
Value: > 500000 ppm
Exposure time: 4 h
Test substance: 1,1,1,2-tetrafluoroethane (HFC-134a)

LC50
Species: Rat
Value: 520000 ppm
Exposure time: 4 h
Test substance: Difluoromethane (HFC-32)

LC50
Species: Rat
Value: > 769000 ppm
Exposure time: 4 h
Test substance: Ethane, pentafluoro- (HFC-125)

Skin irritation:
no data available

Eye irritation:
no data available

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Respiratory or skin sensitisation:

Cardiac sensitization

Species: dogs

Test substance: 1,1,1,2-tetrafluoroethane (HFC-134a)

No-observed-effect level

50 000 ppm

Lowest observed effect level

75 000 ppm

Cardiac sensitization

Species: dogs

Test substance: Difluoromethane (HFC-32)

No-observed-effect level

>350 000 ppm

Cardiac sensitization

Species: dogs

Test substance: Ethane, pentafluoro- (HFC-125)

No-observed-effect level

75 000 ppm

Lowest observed effect level

100 000 ppm

Repeated dose toxicity:

Species: Rat

Application Route: Inhalation

NOAEL: 50000 ppm

Test substance: 1,1,1,2-tetrafluoroethane (HFC-134a)

Note: Subchronic toxicity

Species: Rat

NOAEL: 10000 ppm

Test substance: 1,1,1,2-tetrafluoroethane (HFC-134a)

Note: Chronic toxicity

Species: Rat

Application Route: Inhalation

NOAEL: 50000 ppm

Test substance: Difluoromethane (HFC-32)

Note: Subchronic toxicity

Species: Rat

Application Route: Inhalation

NOAEL_≥: 50000 ppm

Test substance: Ethane, pentafluoro- (HFC-125)

Note: Subchronic toxicity

Germ cell mutagenicity:

Test substance: 1,1,1,2-tetrafluoroethane (HFC-134a)

Note: In vitro tests did not show mutagenic effects

Test substance: Difluoromethane (HFC-32)

Note: In vitro tests did not show mutagenic effects

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Test substance: Ethane, pentafluoro- (HFC-125)

Note: In vitro tests did not show mutagenic effects

Aspiration hazard:

no data available

Other information:

Inhalation: May cause cardiac arrhythmia.

SECTION 12: Ecological information

12.1. Toxicity

Toxicity to fish:

no data available

Toxicity to aquatic plants:

no data available

Toxicity to Microorganisms:

no data available

Toxicity to aquatic invertebrates:

no data available

12.2. Persistence and degradability

no data available

12.3. Bioaccumulative potential

no data available

12.4. Mobility in soil

no data available

12.5. Results of PBT and vPvB assessment

no data available

12.6. Other adverse effects

Accumulation in aquatic organisms is unlikely.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Product:

Offer surplus and non-recyclable solutions to a licensed disposal company. Refer to manufacturer/supplier for information on recovery/recycling. Classification: 14.06.01

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Further information:

Provisions relating to waste:

EC Directive 2006/12/EC; 2008/98/EEC

Regulation No. 1013/2006

For personal protection see section 8.

SECTION 14: Transport information

ADR/RID

UN Number	:	3163
Description of the goods	:	LIQUEFIED GAS, N.O.S. (1,1,1,2-TETRAFLUOROETHANE, DIFLUOROMETHANE, PENTAFLUROETHANE)
Class	:	2
Classification Code	:	2A
Hazard Identification Number	:	20
ADR/RID-Labels	:	2.2
Environmentally hazardous	:	no

IATA

UN Number	:	3163
Description of the goods	:	Liquefied gas, n.o.s. (1,1,1,2-Tetrafluoroethane, Difluoromethane, Pentafluoroethane)
Class	:	2.2
Hazard Labels	:	2.2

IMDG

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

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Other inventory information

US. Toxic Substances Control Act
On TSCA Inventory

Australia. Industrial Chemical (Notification and Assessment) Act
On the inventory, or in compliance with the inventory

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Supersedes 1

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. Toxic Chemical Control Law (TCCL) List
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 Zealand
On the inventory, or in compliance with the inventory

15.2 Chemical safety assessment

A Chemical Safety Assessment has been carried out.

SECTION 16: Other information

Text of H-statements referred to under heading 3

Norflurane	:	H280	Contains gas under pressure; may explode if heated.
Pentafluoroethane	:	H280	Contains gas under pressure; may explode if heated.
Difluoromethane	:	H220 H280	Extremely flammable gas. Contains gas under pressure; may explode if heated.

Further information

All directives and regulations refer to amended versions.
Vertical lines in the left hand margin indicate a relevant amendment from the previous version.

Abbreviations:

EC European Community
CAS Chemical Abstracts Service
DNEL Derived no effect level
PNEC Predicted no effect level
vPvB Very persistent and very bioaccumulative substance
PBT Persistent, bioaccumulative and toxic substance

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006



Genetron Performax® LT (R-407F)

Version 2.2

Revision Date 24.11.2015

Supersedes 1

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.

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Genetron Performax LT 13.3kg/25lb Cyl

Version 1

Revision Date 01/28/2010

Print Date 04/15/2011

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Genetron Performax™ LT
MSDS Number : 000000013866
Product Use Description : Refrigerant

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 +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

Hazard Summary : **WARNING!** Contains gas under pressure; may explode if heated. 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 : Irritating to skin.
Rapid evaporation of the liquid may cause frostbite.

Eyes : Causes serious eye irritation.
May cause frostbite.

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- 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.
Vapours may cause drowsiness and dizziness.
Effects of breathing high concentrations of vapour may include:
Cardiac arrhythmias
- 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 percent
Norflurane	811-97-2	40.00
Difluoromethane	75-10-5	30.00
Pentafluoroethane	354-33-6	30.00

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

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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

Lower explosion limit : None

Upper explosion limit : None

Suitable extinguishing media : The product is not flammable.
ASHRAE 34
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Specific hazards during fire fighting : 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.
In case of fire hazardous decomposition products may be produced such as:
Hydrogen fluoride
Carbon monoxide
Carbon dioxide (CO₂)
Carbonyl halides

Special protective equipment for fire-fighters : Wear self-contained breathing apparatus and protective suit.

Additional advice : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

SECTION 6. ACCIDENTAL RELEASE MEASURES

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- Personal precautions : 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 $\geq 19.5\%$.
- 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 : 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

- 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.

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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

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

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Difluoromethane	75-10-5	WEEL	TWA	1,000 ppm	2,200 mg/m3
		HONEYWELL	TWA		1,000 ppm
Pentafluoroethane	354-33-6	WEEL	TWA	1,000 ppm	4,900 mg/m3
		HONEYWELL	TWA		1,000 ppm

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Form	: Liquefied gas
Color	: clear and colourless
Odor	: ether-like
pH	: neutral
Boiling point/boiling range	: -45.5 °C (-49.9 °F) at 1,013 hPa
Vapor pressure	: 10,218 hPa at 21.1 °C (70.0 °F)
Vapor pressure	: 24,621 hPa at 54.4 °C (129.9 °F)
Relative vapour density	: not determined
Density	: not determined
Partition coefficient: n-octanol/water	: log Pow: 1.06 1,1,1,2-tetrafluoroethane (HFC-134a)
Partition coefficient: n-octanol/water	: log Pow: 1.48 Ethane, pentafluoro- (HFC-125)

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.
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	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	: In case of fire hazardous decomposition products may be produced such as: Gaseous hydrogen fluoride (HF). Carbonyl halides Carbon monoxide Carbon dioxide (CO2)
Hazardous reactions	: Hazardous polymerisation does not occur. Stable under normal conditions.

SECTION 11. TOXICOLOGICAL INFORMATION

Acute oral toxicity	: no data available
Acute dermal toxicity	: no data available
Acute inhalation toxicity	: LC50 rat Dose: > 500000 ppm Exposure time: 4 h Test substance: 1,1,1,2-tetrafluoroethane (HFC-134a)
Acute inhalation toxicity	: LC50 rat Dose: 520000 ppm Exposure time: 4 h Test substance: Difluoromethane (HFC-32)
Acute inhalation toxicity	: LC50 rat Dose: > 769000 ppm Exposure time: 4 h Test substance: Ethane, pentafluoro- (HFC-125)
Skin irritation	: no data available
Eye irritation	: no data available
Sensitisation	: Cardiac sensitization dogs Test substance: 1,1,1,2-tetrafluoroethane (HFC-134a) No-observed-effect level

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	50,000 ppm Lowest observable effect level 75,000 ppm
Sensitisation	: Cardiac sensitization dogs Test substance: Difluoromethane (HFC-32) No-observed-effect level >350,000 ppm
Sensitisation	: Cardiac sensitization dogs Test substance: Ethane, pentafluoro- (HFC-125) No-observed-effect level 75,000 ppm Lowest observable effect level 100,000 ppm
Repeated dose toxicity	: Inhalation rat Subchronic toxicity NOEL: 50000 ppm Test substance: 1,1,1,2-tetrafluoroethane (HFC-134a)
Repeated dose toxicity	: rat Chronic toxicity NOEL: 10000 ppm Test substance: 1,1,1,2-tetrafluoroethane (HFC-134a)
Repeated dose toxicity	: Inhalation rat Subchronic toxicity NOEL: 50000 ppm Test substance: Difluoromethane (HFC-32)
Repeated dose toxicity	: Inhalation rat Subchronic toxicity NOEL: >= 50000 ppm Test substance: Ethane, pentafluoro- (HFC-125)
Genotoxicity in vitro	: Test substance: 1,1,1,2-tetrafluoroethane (HFC-134a) In vitro tests did not show mutagenic effects
Genotoxicity in vitro	: Test substance: Difluoromethane (HFC-32) In vitro tests did not show mutagenic effects
Genotoxicity in vitro	: Test substance: Ethane, pentafluoro- (HFC-125) In vitro tests did not show mutagenic effects
Teratogenicity	: rat Test substance: 1,1,1,2-tetrafluoroethane (HFC-134a) NOEL - 40,000 ppm
Teratogenicity	: rabbit Test substance: 1,1,1,2-tetrafluoroethane (HFC-134a) NOEL - 40,000 ppm
Teratogenicity	: rat Test substance: Difluoromethane (HFC-32) NOEL - 50,000 ppm

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Teratogenicity	:	rabbit Test substance: Difluoromethane (HFC-32) NOEL - 50,000 ppm
Teratogenicity	:	rat Test substance: Ethane, pentafluoro- (HFC-125) NOEL - 50,000 ppm
Teratogenicity	:	rabbit Test substance: Ethane, pentafluoro- (HFC-125) NOEL - 50,000 ppm
Additional advice	:	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

Toxicity to fish	:	Species: not specified no data available
Toxicity to daphnia and other aquatic invertebrates.	:	Species: not specified no data available
Toxicity to bacteria	:	Species: not specified no data available
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

Waste Information:	Observe all Federal, State, and Local Environmental regulations.
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.

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SECTION 14. TRANSPORT INFORMATION

DOT	UN-Number	: 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 Number	: 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	Substance 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
	Marine pollutant	: no

SECTION 15. REGULATORY INFORMATION

Inventories

1907/2006 (EU)	: This mixture contains only ingredients which have been subject to a pre-registration according to Regulation (EC) No. 1907/2006 (REACH).
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 list.

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Japan. Kashin-Hou Law List : On the inventory, or in compliance with the inventory

Korea. Toxic Chemical Control Law (TCCL) List : 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 Zealand : On the inventory, or in compliance with the inventory

National regulatory information

SARA 311/312 Hazards : Sudden Release of Pressure Hazard
Acute Health Hazard

California Prop. 65 : WARNING! This product contains a chemical known to the State of California to cause cancer.
Dichloromethane 75-09-2

: WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.
Chloromethane 74-87-3

Massachusetts RTK : Dichloromethane 75-09-2

New Jersey RTK : Difluoromethane 75-10-5

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Pennsylvania RTK : Difluoromethane 75-10-5

WHMIS Classification : A
This product has been classified according to the hazard criteria of the CPR and the MSDS contains all of the information required by the CPR.

SECTION 16. OTHER INFORMATION

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