



物料安全資料表

危害物料資料

1. 產品與用途							
1.1 物料名稱	: R513A Refrigerant						
1.2 用途	: 雪種						
2. 危害成份							
2.1 危害分類及標籤 :							
	有害	有毒	腐蝕性	易燃	刺激性	爆炸性	助燃
	()	()	()	()	()	()	()
2.2 酸鹼值(pH)	: 不適用			2.3 曝露限制(OEL) :	: 不適用		
2.4 致癌物質	: 不適用			2.5 其他危害	: 無資料		
2.5 潛在危害	: 吸入：大量吸入可能會引致心律不整。						
	: 皮膚接觸：液態濺射可能引致凍傷。						
	: 眼睛接觸：液態濺射或霧化噴射可能會引致凍傷。						
3. 火警和爆炸資料							
3.1 燃燒物成份比例	: 無資料, 不易燃		3.2 沸點(°C) :	-29.2		3.3 溶點(°C) :	無資料
3.4 閃點(°C)	: 無資料		3.5 比重	: 無資料		3.6 氣壓力	: 0.637MPa at 21.1°C
3.7 爆炸極限(濃度)	: 不適用		3.8 溶解度	: 無資料		3.9 氣味	: 輕微
3.10 滅火設備	: 使用水劑、泡沫、乾粉或二氧化碳的滅火器，用水把火降溫。						
4. 急救處理							
4.1 眼睛接觸	: 立刻用眼藥水及清水清洗，維持眼睛張開最少 15 分鐘						
4.2 皮膚接觸	: 接觸皮膚後，立即用大量水沖洗。如果有凍傷的跡象，請用溫水（而不是熱水）清洗。如果沒有水，請用乾淨的軟布或類似的覆蓋物覆蓋。如果症狀持續，立即求醫。						
4.3 吸入	: 移至空氣新鮮處。如果呼吸不規則或停止，進行人工呼吸；如果症狀持續，立即求醫。						
5. 個人防護裝備							
<input checked="" type="checkbox"/> 防凍手套			<input checked="" type="checkbox"/> 防化學品護眼罩				
6. 處理及使用應知事項							
6.1 儲存注意事項:	<ul style="list-style-type: none"> • 存放於乾爽清涼的地方、儲存溫度：不可高於50°C • 避免太陽直接照射、遠離熱源 						
6.2 意外洩漏處理的方法:	在清除洩漏雪種時，穿上個人防護裝備。分隔洩漏根源，在足夠通風下，令雪種蒸發。 嚴重洩漏時：可用沙、泥土及適當物品吸乾。						
7. 其他資料							
無資料							

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SECTION 1. IDENTIFICATION

Product name : Solstice® 513A

Number : 000000022892

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 colourless

Odor : slight 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

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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 cardiac arrhythmia.
May cause frostbite.
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

Chemical nature

: Mixture

Chemical name	CAS-No.	Concentration
2,3,3,3-Tetrafluoroprop-1-ene	754-12-1	56.00 %
1,1,1,2-Tetrafluoroethane	811-97-2	44.00 %

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

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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.
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 firefighting : 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

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Special protective equipment for firefighters : 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.

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 : 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 $\geq 19.5\%$.

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 : 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.

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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).

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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

Components	CAS-No.	Value	Control parameters	Update	Basis
2,3,3,3-Tetrafluoroprop-1-ene	754-12-1	TWA : Time weighted average	(500 ppm)	2009	WEEL:US. OARS. WEELs Workplace Environmental Exposure Level Guide
2,3,3,3-Tetrafluoroprop-1-ene	754-12-1	TWA : Time weighted average	(500 ppm)	03 15 2010	Honeywell:Limit established by Honeywell International Inc.
2,3,3,3-Tetrafluoroprop-1-ene	754-12-1	STEL : Short term exposure limit	(1,500 ppm)	03 15 2010	Honeywell:Limit established by Honeywell International Inc.
1,1,1,2-Tetrafluoroethane	811-97-2	TWA : Time weighted average	(1,000 ppm)		Honeywell:Limit established by Honeywell International Inc.

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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
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SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state	: Liquefied gas
Color	: clear colourless
Odor	: slight ether-like
Odor threshold	: Note: no data available
pH	: Note: Not applicable
Melting point/range	: Note: no data available
Boiling point/boiling range	: -29.2 °C
Flash point	: Note: Not applicable
Flammability	: The product is not flammable.
Lower explosion limit	: Note: None
Upper explosion limit	: Note: None
Vapor pressure	: 0.637 MPa at 21.1 °C(70.0 °F)
Vapor density	: 3.83 Note: (Air = 1.0)
Density	: 1.15 g/cm3 at 21.1 °C

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Water solubility	: Note: no data available
Partition coefficient: n-octanol/water	: Note: no data available
Ignition temperature	: Note: no data available
Auto-ignition temperature	: > 750 °C
Decomposition temperature	: > 250 °C Note: To avoid thermal decomposition, do not overheat.
Viscosity, dynamic	: Note: no data available
Viscosity, kinematic	: 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

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SECTION 11. TOXICOLOGICAL INFORMATION

Acute inhalation toxicity
2,3,3,3-Tetrafluoroprop-1-ene

: LC50: > 400000 ppm
Exposure time: 4 h
Species: Rat
Method: OECD Test Guideline 403

1,1,1,2-Tetrafluoroethane

: LC50: > 500000 ppm
Exposure time: 4 h
Species: Rat

Skin irritation

: Note: Not applicable study technically not feasible

Eye irritation

: Note: Not applicable study technically not feasible

Sensitisation

2,3,3,3-Tetrafluoroprop-1-ene

: Dermal
Note: Not applicable, as this product is a gas.
study technically not feasible

1,1,1,2-Tetrafluoroethane

: Cardiac sensitization
Species: dogs
Note: No-observed-effect level
50 000 ppm
Lowest observed effect level
75 000 ppm

Repeated dose toxicity

2,3,3,3-Tetrafluoroprop-1-ene

: Species: Rat
Application Route: Inhalation
Exposure time: (2 Weeks)
No-observed-effect level: 50000 ppm
Method: OECD Test Guideline 412

Species: Rat
Application Route: Inhalation
Exposure time: (4 Weeks)
NOAEL (No observed adverse effect level): 50000 ppm
Method: OECD Test Guideline 412

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Species: Rat
Application Route: Inhalation
Exposure time: (13 Weeks)
NOAEL (No observed adverse effect level): 50000 ppm
Method: OECD Test Guideline 413

Species: Rabbit, male
Application Route: Inhalation
Exposure time: (28 d)
No-observed-effect level: 500 ppm
Method: OECD Test Guideline 412
There are no observed toxicological effects, which result in classification as a specific target organ toxicant.

Species: Rabbit, female
Application Route: Inhalation
Exposure time: (28 d)
No-observed-effect level: 1000 ppm
Method: OECD Test Guideline 412
There are no observed toxicological effects, which result in classification as a specific target organ toxicant.

Species: Mini-pig
Application Route: Inhalation
Exposure time: (28 d)
NOAEL (No observed adverse effect level): 10000 ppm
highest exposure tested

1,1,1,2-Tetrafluoroethane : Species: Rat
NOEL: 40000 ppm

Genotoxicity in vitro
2,3,3,3-Tetrafluoroprop-1-ene : Test Method: Ames test
Result: 20% and higher, positive in TA 100 and e. coli WP2 uvrA, negative in TA98, TA100, and TA1535.
Method: OECD Test Guideline 471

1,1,1,2-Tetrafluoroethane : Note: In vitro tests did not show mutagenic effects
: Test Method: Chromosome aberration test in vitro
Cell type: Human lymphocytes
Result: negative
Method: OECD Test Guideline 473
Note: Dose 760,000 ppm

Genotoxicity in vivo

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- 2,3,3,3-Tetrafluoroprop-1-ene : Species: Mouse
Cell type: Micronucleus
Dose: up to 200,000 ppm (4 hour)
Method: OECD Test Guideline 474
Result: negative
- : Test Method: Unscheduled DNA synthesis
Dose: up to 50,000 ppm (4 weeks)
Method: OECD Test Guideline 486
Result: negative
- : Species: Rat
Cell type: Micronucleus
Dose: up to 50,000 ppm (4 weeks)
Method: OECD Test Guideline 474
Result: negative
- Carcinogenicity
2,3,3,3-Tetrafluoroprop-1-ene : Species: Rat
Note: Not classified as a human carcinogen. Substance not expected to be a carcinogen based on available data.
- Further information : Note: Rapid evaporation of the liquid may cause frostbite. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. Handle in accordance with good industrial hygiene and safety practice.

SECTION 12. ECOLOGICAL INFORMATION**Ecotoxicity effects**

- Toxicity to fish
2,3,3,3-Tetrafluoroprop-1-ene : LC50: > 197 mg/l
Exposure time: 96 h
Species: Cyprinus carpio (Carp)
Method: OECD Test Guideline 203
Note: No demonstrable toxic effect in saturated solution.

- Toxicity to daphnia and other aquatic invertebrates
2,3,3,3-Tetrafluoroprop-1-ene : EC50: > 83 mg/l
Exposure time: 48 h

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Species: Daphnia magna (Water flea)

Method: OECD Test Guideline 202

Toxicity to algae

2,3,3,3-Tetrafluoroprop-1-ene

: EC50: > 100 mg/l

Species: Scenedesmus capricornutum (fresh water algae)

Method: OECD Test Guideline 201

Toxicity to bacteria

: Growth inhibition

EC10: > 730 mg/l

Exposure time: 6 h

Species: Pseudomonas putida

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

Elimination information (persistence and degradability)

Bioaccumulation

2,3,3,3-Tetrafluoroprop-1-ene

: Note: Due to the distribution coefficient n-octanol/water, accumulation in organisms is not expected.

Biodegradability

: Result: Not rapidly biodegradable

Value: 3 %

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

Method: OECD 301 D

Further information on ecology**Ecotoxicology Assessment**

Results of PBT assessment

This substance is not considered to be persistent, bioaccumulating and toxic (PBT)., This substance is not considered to be very persistent and very bioaccumulating (vPvB).

Additional ecological information

: Accumulation in aquatic organisms is unlikely.

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.

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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. (R-1234yf, 1,1,1,2-Tetrafluoroethane)
	Class	: 2.2
	Packing group	
	Hazard Labels	: 2.2
IATA	UN/ID No.	: UN 3163
	Description of the goods	: LIQUEFIED GAS, N.O.S. (R-1234yf, 1,1,1,2-Tetrafluoroethane)
	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. (R-1234yf, 1,1,1,2-TETRAFLUOROETHANE)
	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 : All components of this product are on the Canadian DSL

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Act (CEPA). Domestic
Substances List (DSL)

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

Korea. Existing Chemicals : On the inventory, or in compliance with the inventory
Inventory (KECI)

Philippines. The Toxic : Not in compliance with the inventory
Substances and Hazardous
and Nuclear Waste Control
Act

China. Inventory of Existing : Not in compliance with the inventory
Chemical Substances

New Zealand. Inventory of : Not in compliance with the inventory
Chemicals (NZIoC), as
published by ERMA New
Zealand

TSCA 12B : US. Toxic Substances Control Act (TSCA) Section 12(b) Export
Notification (40 CFR 707, Subpt D)

2,3,3,3-Tetrafluoroprop-1-ene 754-12-1

National regulatory information

US. Toxic Substances :
Control Act (TSCA) Section : Issued.
5(a)(2) Final Significant
New Use Rules (SNURs)
(40 CFR 721, Subpt E)

: 2,3,3,3-Tetrafluoroprop-1-ene 754-12-1

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 : This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

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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Prepared by Honeywell Performance Materials and Technologies Product Stewardship Group