



Air Conditioning Products
Tools, Equipment & Refrigerant

SAFETY DATA SHEET

Section 1. CHEMICAL PRODUCT SECTION

Product Name: Solstice[®] yf Refrigerant (R-1234yf)

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Manufacturer: Honeywell International Inc.
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Morristown, NJ 07962-1057
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Section 2. HAZARDS IDENTIFICATION



Emergency Overview:

Form: Liquefied gas

Color: Clear

Odor: Slight

Classification of the subject or mixture: Flammable gases, Category 1
Gases under pressure, Liquefied gas
Simple Asphyxiant

Signal word: Danger

Hazard statements: Extremely flammable gas. Contains gas under pressure; may explode if heated. May displace oxygen and cause rapid suffocation.

Prevention: Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

Response: Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.

Storage: Protect from sunlight. Store in a well-ventilated place.

Hazards not otherwise classified: May cause eye and skin irritation. May cause frostbite.

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 Name	CAS-No.	Concentration
2,3,3,3-Tetrafluoroprop-1-ene	754-12-1	100.00 %

Section 4.**FIRST AID MEASURES**

General advice	First aider needs to protect himself. Take off all contaminated clothing immediately.
Inhalation	Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Use oxygen as required, provided a qualified operator is present. Call a physician.
Skin contact	After contact with skin, wash immediately with plenty of water. Rapid evaporation of the liquid may cause frostbite. 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. Call a physician. Wash contaminated clothing before re-use.
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. 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. If conscious, drink plenty of water. Never give anything by mouth to an unconscious person. Call a physician immediately.

Notes to physician

Treatment: Treat frost-bitten areas as needed. Treat symptomatically.

Section 5.**FIRE FIGHTING MEASURES**

Suitable extinguishing media: In case of fire, allow gas to burn if flow cannot be shut off immediately. Apply water from a safe distance to cool container and protect surrounding area. Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Specific hazards during firefighting: Flammable gas. firefighting Contents under pressure.

Section 6.**ACCIDENTAL RELEASE MEASURES****Personal precautions:**

Immediately evacuate personnel to safe areas.
Keep people away from and upwind of spill/leak.
Wear personal protective equipment. Unprotected persons must be kept away.

Wear self-contained breathing apparatus and protective suit.
Eliminate all ignition sources if safe to do so.
Avoid skin contact with leaking liquid (danger of frostbite).
Ventilate the area.
Vapors may travel to areas away from work site before igniting/flashing back to vapor source.
Vapors are heavier than air and can cause suffocation by reducing oxygen available for breathing. Avoid accumulation of vapors 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. Discharge into the environment must be avoided.

Methods for cleaning up

Use explosion-proof equipment. No sparking tools should be used. Ventilate the area. Allow to evaporate.

Section 7.

HANDLING AND STORAGE

Handling

Handle with care.
Wear personal protective equipment.
Do not breathe vapor.
Avoid contact with skin, eyes and clothing.
Use only in well-ventilated areas.
Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50 °C.
Follow all standard safety precautions for handling and use of compressed gas cylinders.
Use authorized cylinders only.
Protect cylinders from physical damage.
Do not puncture or drop cylinders, expose them to open flame or excessive heat.
Do not remove screw cap until immediately ready for use. Always replace cap after use.

Advice on protection against fire and explosion

Container hazardous when empty.
Prevent the creation of flammable or explosive concentrations of vapour in air and avoid vapour concentration higher than the occupational exposure limits.
Keep product and empty container away from heat and sources of ignition.
Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.
Take measures to prevent the build up of electrostatic charge. Electrical equipment should be protected to the appropriate standard.
Use explosion-proof equipment.
No sparking tools should be used.
No smoking.

Storage

Pressurized container: protect from sunlight and do not expose areas and containers 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.
Keep away from heat and sources of ignition.
Storage rooms must be properly ventilated.
Ensure adequate ventilation, especially in confined areas.
Protect cylinders from physical damage.
Store away from incompatible substances. Store in original container.

Section 8.**EXPOSURE CONTROL/PERSONAL PROTECTION**

Protective measures: Ensure that eyewash stations and safety showers are close to the workstation location. Do not breathe vapour. Avoid contact with skin, eyes and clothing.

Engineering measures: Use with local exhaust ventilation.

Eye protection : Safety goggles

Hand protection : Protective gloves. Gloves must be inspected prior to use. Replace when worn.

Skin and body protection : Avoid skin contact with leaking liquid (danger of frostbite). Wear suitable protective equipment.

Respiratory protection : No personal respiratory protective equipment normally required. When workers are facing concentrations above the exposure limit they must use appropriate certified respirators. Use NIOSH approved respiratory protection.

Hygiene measures: Handle in accordance with good industrial hygiene and safety practice. Ensure adequate ventilation, especially in confined areas. When using do not eat, drink or smoke.

Flash point & additional flammability data found in section 5.

Remove and wash contaminated clothing before re-use. Keep working clothes separately. Do not breathe vapor. Avoid contact with skin, eyes and clothing.

Exposure Guidelines

Components	CAS-No.	Value	Control parameters	Update	Basis
2,3,3,3-Tetrafluoroprop1-ene	754-12-1	TWA : time weighted average	(500 ppm)	2009	WEEL:US. AIHA Workplace Environmental Exposure Level (WEEL) Guides
2,3,3,3-Tetrafluoroprop1-ene	754-12-1	TWA : time weighted average	(500 ppm)	03 15 2010	Honeywell:Limit established by Honeywell International Inc.
2,3,3,3-Tetrafluoroprop1-ene	754-12-1	STEL : Short term exposure limit	(1,500 ppm)	03 15 2010	Honeywell:Limit established by Honeywell International Inc.

Section 9.**PHYSICAL AND CHEMICAL PROPERTIES****SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES**

Physical state : Liquefied gas

Color : clear

Odor : slight

pH : Note: no data available

Boiling point/boiling range : -29.4 °C

Flash point : Note: not applicable

Evaporation point: Note: not determined

Lower flammability limit: 6% (V)

Upper flammability limit: 12.3% (V)

Vapor Pressure: 6,067 hPa at 21.1 °C(70.0 °F)
14,203 hPa at 54.4 °C(129.9 °F)

Vapor Density: 4 Note: (Air = 1.0)

Density: 1.1 g/cm³ at 25 °C

Water solubility: 198.2 mg/l at 24 °C

Ignition temperature: 405 °C (Method: Auto-ignition)

Molecular weight: 114 g/mol

Section 10.**STABILITY AND REACTIVITY**

Chemical stability	: Stable under normal conditions.
Possibility of hazardous reactions	: Hazardous <u>polymerisation</u> does not occur.
Conditions to avoid	: Keep away from heat and sources of ignition. Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50 °C. Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Decomposes under high temperature. Some risk may be expected of corrosive and toxic decomposition products.
Incompatible materials to avoid	: Strong oxidizing agents Finely divided <u>aluminium</u> Finely divided magnesium Zinc
Hazardous decomposition products produced such as:	: In case of fire hazardous decomposition products may be products Hydrogen fluoride Carbonyl halides Carbon monoxide Carbon dioxide (CO ₂)

Section 11.**TOXICOLOGICAL INFORMATION**

Acute inhalation toxicity	: LC50: > 400000 ppm Exposure time: 4 h Species: rat
<u>Sensitisation</u>	: Cardiac sensitization Species: dogs Result: No effects observed for exposures up to 12% (120,189 ppm).
Repeated dose toxicity	: Species: rat Application Route: Inhalation Exposure time: 2 Weeks No-observed-effect level: 50000 ppm

| Species: rat
Application Route: Inhalation
Exposure time: 4 Weeks
NOAEL (No observed adverse effect level): 50000 ppm

: Species: rat
Application Route: Inhalation
Exposure time: 13 Weeks
NOAEL (No observed adverse effect level): 50000 ppm

: Species: rabbit, male
Application Route: Inhalation
Exposure time: 28 d
No-observed-effect level: 500 ppm

: Species: rabbit, female
Application Route: Inhalation
Exposure time: 28 d
No-observed-effect level: 1000 ppm

: Species: mini-pig
Application Route: Inhalation
Exposure time: 28 d
NOAEL (No observed adverse effect level): 10,000 ppm Note:
highest exposure tested

Genotoxicity in vitro

: Test Method: Ames test
Result: 20% and higher, positive in TA 100 and e. coli WP2
uyrA, negative in TA98, TA100, and TA1535.

: Test Method: Chromosome aberration test in vitro
Cell type: Human lymphocytes
Result: negative
Note: Dose 760,000 ppm

: Test Method: Chromosome aberration test in vitro
Cell type: Chinese Hamster Lung Cells
Result: negative

Genotoxicity in vivo

: Species: mouse
Cell type: Micronucleus
Dose: up to 200,000 ppm (4 hour)
Result: negative

Section 13. DISPOSAL CONSIDERATIONS

Observe all Federal, State, and Local Environmental regulations

Section 14.**TRANSPORTATION INFORMATION**

US DOT Information:

UN/ID No: UN 3161
Shipping Name: 1,1,1,2-tetrafluoroethane
LIQUEFIED GAS, FLAMMABLE, N.O.S (R-
1234yf)
Shipping Class: 2.1
Hazard Labels: 2.1

ICAO/IATA

UN/ID No: UN 3161
Shipping Name: 1,1,1,2-tetrafluoroethane
LIQUEFIED GAS, FLAMMABLE, N.O.S (R-
1234yf)
Shipping Class: 2.1
Hazard Labels: 2.1
Instructions: Cargo 200 aircraft

IMDG

UN/ID No: UN 3161
Shipping Name: 1,1,1,2-tetrafluoroethane
LIQUEFIED GAS, FLAMMABLE, N.O.S (R-
1234yf)
Shipping Class: 2.1
Hazard Labels: 2.1
EmS #: F-D, S-U

Section 15.**REGULATORY INFORMATION****Inventories**

US. Toxic Substances : On TSCA Inventory
Control Act

Australia. Industrial : Not in compliance with the inventory
Chemical (Notification and
Assessment) Act

: 2,3,3,3-Tetrafluoroprop-1-ene 754-12-1
Canada. Canadian : All components of this product are on the Canadian DSL. Environmental
Protection
Act (CEPA). Domestic
Substances List (DSL)

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

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

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

China. Inventory of Existing Chemical Substances : 2,3,3,3-Tetrafluoroprop-1-ene 754-12-1
: Not in compliance with the inventory

New Zealand. Inventory of Chemicals (NZIoC), as published by ERMA New Zealand : 2,3,3,3-Tetrafluoroprop-1-ene 754-12-1
: Not in compliance with the inventory

TSCA 12B : 2,3,3,3-Tetrafluoroprop-1-ene 754-12-1
: 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 5(a)(2) Final Significant New Use Rules (SNURs) (40 CFR 721, Subpt E)	:	Issued.	
	:	2,3,3,3-Tetrafluoroprop-1-ene	754-12-1
SARA 302 Components	:	SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.	
SARA 313 Components	:	SARA 313: 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	:	Fire Hazard Acute Health Hazard Sudden Release of Pressure Hazard	
California Prop. 65	:	This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.	
New Jersey RTK	:	2,3,3,3-Tetrafluoroprop-1-ene	754-12-1
Pennsylvania RTK	:	2,3,3,3-Tetrafluoroprop-1-ene	754-12-1
WHMIS Classification	:	B1: Flammable gas 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		: 0	2
Flammability	: 2	2	Physical Hazard : 2
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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