

SAFETY DATA SHEET

Solstice® yf Refrigerant (R-1234yf)

10616573

Version 3.4

Issuing date 11/30/2011

Revision Date 01/08/2025

Print Date 01/08/2025

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

Product information

Trade name : Solstice® yf Refrigerant (R-1234yf)

Number : 000000011078

Recommended use of the chemical and restrictions on use : Refrigerant

Manufacturer or supplier's details : Honeywell International Inc.
115 Tabor Road
Morris Plains, NJ 07950-2546

For further information, please contact: : 800-522-8001
In China: 021-28942149
(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**
: **In China: 4001-204937 or +86 532-83889090**
: (24 hours/day, 7 days/week)

2. HAZARDS IDENTIFICATION

Classification of the substance or mixture

Classification of the substance or mixture : Flammable gases, Category 1
Gases under pressure, Liquefied gas
Short-term (acute) aquatic hazard, Category 3

GHS Label elements, including precautionary statements

Symbol(s) :



Signal word : Danger

Hazard statements : Extremely flammable gas.
Contains gas under pressure; may explode if heated.
Harmful to aquatic life.

Precautionary statements : **Prevention:**

SAFETY DATA SHEET

Solstice® yf Refrigerant (R-1234yf)

10616573

Version 3.4

Issuing date 11/30/2011

Revision Date 01/08/2025

Print Date 01/08/2025

Keep away from heat/sparks/open flames/hot surfaces. No smoking.
Avoid release to the environment.

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.

Disposal:

Dispose of contents/ container to an approved waste disposal plant.

Other hazards which do not result in classification

: Causes asphyxiation in high concentrations. The victim will not realize that he/she is suffocating.
May cause frostbite.
May irritate skin.
May irritate eyes.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical nature : Substance

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

4. FIRST AID MEASURES

General advice : First aider needs to protect himself.
Move out of dangerous area.
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 : Rapid evaporation of the liquid may cause frostbite.

SAFETY DATA SHEET

Solstice® yf Refrigerant (R-1234yf)

10616573

Version 3.4

Issuing date 11/30/2011

Revision Date 01/08/2025

Print Date 01/08/2025

	<p>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. Wash contaminated clothing before re-use. Consult a physician.</p>
Eye contact	<p>: 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.</p>
Ingestion	<p>: 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.</p>
Notes to physician	<p>: Treat frost-bitten areas as needed. Treat symptomatically.</p>

5. FIREFIGHTING MEASURES

Suitable extinguishing media	<p>: 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.</p>
Specific hazards during firefighting	<p>: Flammable gas. Contents under pressure. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. Vapors may travel to areas away from work site before igniting/flashing back to vapor source. Fire or intense heat may cause violent rupture of packages. Cool closed containers exposed to fire with water spray. Do not allow run-off from fire fighting to enter drains or water courses. In case of fire hazardous decomposition products may be produced such as: Hydrogen fluoride Carbonyl halides Carbon monoxide Carbon dioxide (CO2)</p>

SAFETY DATA SHEET

Solstice® yf Refrigerant (R-1234yf)

10616573

Version 3.4

Issuing date 11/30/2011

Revision Date 01/08/2025

Print Date 01/08/2025

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

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.
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/flashback to vapor source.
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.
Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up : Use explosion-proof equipment.
No sparking tools should be used.
Ventilate the area.
Allow to evaporate.

7. HANDLING AND STORAGE

Handling

Precautions for safe handling : Handle with care.
Wear personal protective equipment.
Do not breathe vapour.
Avoid contact with skin, eyes and clothing.
Use only in well-ventilated areas.

SAFETY DATA SHEET

Solstice® yf Refrigerant (R-1234yf)

10616573

Version 3.4

Issuing date 11/30/2011

Revision Date 01/08/2025

Print Date 01/08/2025

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.

Vapours may form flammable mixture with air.

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

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.

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.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Update	Basis
------------	---------	-------	--------------------	--------	-------

SAFETY DATA SHEET

Solstice® yf Refrigerant (R-1234yf)

10616573

Version 3.4

Issuing date 11/30/2011

Revision Date 01/08/2025

Print Date 01/08/2025

2,3,3,3-Tetrafluoropro p-1-ene 2,3,3,3-Tetrafluoropro p-1-ene	754-12-1	TWA : Time weighted average	(500 ppm)	03 15 2010	Honeywell:Limit established by Honeywell International Inc.
		STEL : Short term exposure limit	(1,500 ppm)	03 15 2010	Honeywell:Limit established by Honeywell International Inc.
		TWA : Time weighted average	(500 ppm)	2009	WEEL:US. OARS. WEELs Workplace Environmental Exposure Level Guide, as amended

Appropriate engineering controls

Use with local exhaust ventilation.

Individual protection measures, such as personal 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.

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

Eye protection : Safety goggles

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

Hygiene measures : Handle in accordance with good industrial hygiene and safety practice.
Ensure adequate ventilation, especially in confined areas.

SAFETY DATA SHEET

Solstice® yf Refrigerant (R-1234yf)

10616573

Version 3.4

Issuing date 11/30/2011

Revision Date 01/08/2025

Print Date 01/08/2025

When using do not eat, drink or smoke.
Remove and wash contaminated clothing before re-use.
Keep working clothes separately.
Do not breathe vapour.
Avoid contact with skin, eyes and clothing.

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.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state : Liquefied gas

Colour : colourless

Odour : slight

pH : Note: Not applicable, as this product is a gas.

Melting point/range : Note: Not applicable, as this product is a gas.

Boiling point/boiling range : -29.4 °C

Flash point : Note: Not applicable, as this product is a gas.

Evaporation rate : Note: Not applicable, as this product is a gas.

lower flammability limit : 6.2 %(V)
Method: ASTM E681-04

upper flammability limit : 12.3 %(V)
Method: ASTM E681-04

Vapour pressure : 6,067 hPa
at 21.1 °C(70.0 °F)

14,203 hPa
at 54.4 °C(129.9 °F)

SAFETY DATA SHEET

Solstice® yf Refrigerant (R-1234yf)

10616573

Version 3.4

Issuing date 11/30/2011

Revision Date 01/08/2025

Print Date 01/08/2025

Vapour density	: 4
Specific gravity	: Note: Not applicable
Water solubility	: 198.2 mg/l at 24 °C
Partition coefficient: n-octanol/water	: log Pow: 2.15
Ignition temperature	: 405 °C Method: Auto-ignition temperature
Viscosity, dynamic	: Note: Not applicable, as this product is a gas.
Viscosity, kinematic	: Note: Not applicable, as this product is a gas.
Particle size	: Note: Not applicable
Oxidizing properties	: Not applicable: Not expected to have oxidizing properties based on theoretical evaluation
Molecular weight	: 114 g/mol
Surface tension	: Note: Not applicable

10. STABILITY AND REACTIVITY

Chemical stability	: Stable under normal conditions.
Possibility of hazardous reactions	: Hazardous polymerisation 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. To avoid thermal decomposition, do not overheat. Some risk may be expected of corrosive and toxic

SAFETY DATA SHEET

Solstice® yf Refrigerant (R-1234yf)

10616573

Version 3.4

Issuing date 11/30/2011

Revision Date 01/08/2025

Print Date 01/08/2025

decomposition products.

Incompatible materials to avoid

: Alkali metals
Oxidizers (e.g. peroxide residues present in insufficiently cured rubbers)
Finely divided metal powders such as aluminum, magnesium, or zinc.

Hazardous decomposition products

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

11. TOXICOLOGICAL INFORMATION

Acute inhalation toxicity

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

Skin irritation

: Note: Not applicable study technically not feasible

Eye irritation

: Note: Not applicable study technically not feasible

Sensitisation

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

Repeated dose toxicity

: 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

SAFETY DATA SHEET

Solstice® yf Refrigerant (R-1234yf)

10616573

Version 3.4

Issuing date 11/30/2011

Revision Date 01/08/2025

Print Date 01/08/2025

- : 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
Note: 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
Note: 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
Note: highest exposure tested
- Genotoxicity in vitro
 - : Test Method: Ames test
Result: positive negative
 - : 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
 - : Test Method: Unscheduled DNA synthesis
Dose: up to 50,000 ppm (4 weeks)
Method: OECD Test Guideline 486
Result: negative
- Genotoxicity in vivo
 - : Species: Rat
Cell type: Micronucleus
Dose: up to 50,000 ppm (4 weeks)
Method: OECD Test Guideline 474

SAFETY DATA SHEET

Solstice® yf Refrigerant (R-1234yf)

10616573

Version 3.4

Issuing date 11/30/2011

Revision Date 01/08/2025

Print Date 01/08/2025

Result: negative

Carcinogenicity	: Species: Rat Note: Not classified as a human carcinogen. Substance not expected to be a carcinogen based on available data.
Reproductive toxicity	: Species: Rat Application Route: Inhalation exposure Exposure time: Two-generation reproductive toxicity NOAEL,parent: 50,000 ppm NOAEL,F1: 50,000 ppm NOAEL,F2: 50,000 ppm
Teratogenicity	: Species: Rat Dose: NOAEL (No observed adverse effect level) - 50,000 ppm : Species: Rabbit Dose: NOAEL (No observed adverse effect level) - 4,000 ppm
Aspiration toxicity	: Not applicable, as this product is a gas. study technically not feasible
Further information	: Note: Cardiac Sensitization (dog): No effects for exposures up to 12% (120,189 ppm)

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	: 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. : LC50: 10 - 100 mg/l Species: not specified Method: The guidelines for the testing of chemicals 203: fish acute toxicity test
------------------	--

SAFETY DATA SHEET

Solstice® yf Refrigerant (R-1234yf)

10616573

Version 3.4

Issuing date 11/30/2011

Revision Date 01/08/2025

Print Date 01/08/2025

Toxicity to daphnia and other aquatic invertebrates : EC50: > 83 mg/l
Exposure time: 48 h
Species: Daphnia magna (Water flea)
Method: OECD Test Guideline 202

Toxicity to algae : EC50: > 100 mg/l
Species: Scenedesmus capricornutum (fresh water algae)
Method: OECD Test Guideline 201

Persistence and degradability

Surface tension : Note: Not applicable

Biodegradability : Result: Not readily biodegradable.
Method: OECD Test Guideline 301F

Bioaccumulative potential

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

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).

13. DISPOSAL CONSIDERATIONS

CN HW China. National Catalogue of Hazardous Wastes : Hazardous waste

Disposal methods : In accordance with local and national regulations.

Disposal methods : Chemical residues in raw materials by the "National List of Hazardous Wastes" of the regulations, a hazardous waste, pollutants are according to Chinese state or local laws and regulations of the waste classification. According to our law requires specialized units to deal with commission, usually the

SAFETY DATA SHEET

Solstice® yf Refrigerant (R-1234yf)

10616573

Version 3.4

Issuing date 11/30/2011

Revision Date 01/08/2025

Print Date 01/08/2025

final disposal of incineration or other legal means to dispose of.

14. TRANSPORT INFORMATION

CNDG

UN/ID No. : UN 3161
Description of the goods : LIQUEFIED GAS, FLAMMABLE, N.O.S.
(R-1234yf)
Class : 2.1
Labels : 2.1

IATA

UN/ID No. : UN 3161
Description of the goods : Liquefied gas, flammable, n.o.s.
(R-1234yf)
Class : 2.1
Labels : 2.1
Packing instruction (cargo aircraft) : 200

IATA_P

UN/ID No. : UN 3161
Class : 2.1
Not permitted for transport

IMDG

UN/ID No. : UN 3161
Description of the goods : LIQUEFIED GAS, FLAMMABLE, N.O.S.
(R-1234yf)
Class : 2.1
Labels : 2.1
EmS Number 1 : F-D
EmS Number 2 : S-U
Marine pollutant : no

15. REGULATORY INFORMATION

National regulatory information

: Refer to the following regulations: Dangerous Chemicals Management Ordinance, the State Council Order No. 591; GB16483-2008 MSDS content and order of items; GB-T 17519-2013 Material Safety Data Sheet written rules; GB12268-2012 Name List of dangerous goods; GB6944-2012 and the name of dangerous goods classification number; GB13690-2009

SAFETY DATA SHEET

Solstice® yf Refrigerant (R-1234yf)

10616573

Version 3.4

Issuing date 11/30/2011

Revision Date 01/08/2025

Print Date 01/08/2025

chemical formula for risk classification and General; GBZ 2.1-2007 workplace hazards Part 1 occupational exposure limit chemical hazards; GB30000.2~29-2013 classification of chemicals, warning labels and warning statements of safety norms

Other international regulations

Notification status

US. Toxic Substances Control Act : On TSCA Inventory

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

Canada. Canadian Environmental Protection Act (CEPA). Domestic Substances List (DSL) : All components of this product are on the Canadian DSL

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

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

Philippines. The Toxic Substances and Hazardous and Nuclear Waste Control Act : On the inventory, or in compliance with the inventory

China. Inventory of Existing Chemical Substances (IECSC) : 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

SAFETY DATA SHEET

Solstice® yf Refrigerant (R-1234yf)

10616573

Version 3.4

Issuing date 11/30/2011

Revision Date 01/08/2025

Print Date 01/08/2025

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.

Previous Issue Date: 08/03/2018

Prepared by Honeywell Performance Materials and Technologies Product Stewardship Group