

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006, as amended



Honeywell Solstice® L41y Refrigerant (R-452B)

000000020160

Version 1.1

Revision Date 28.03.2026

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

1.1. Product identifier

Product name : Honeywell Solstice® L41y Refrigerant (R-452B)
SDS-number : 000000020160
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 : SOLSTICE ADVANCED MATERIALS IRELAND LIMITED
1st Floor, Liffey Trust Centre,
117-126 Sheriff Street Upper
D01 YC43 Dublin
Ireland
Telephone : +353 1 536 5150
For further information,
please contact: : SafetyDataSheet@solstice.com

Solstice Advanced Materials
US, Inc.
115 Tabor Road
Morris Plains, NJ 07950-2546
USA

1.4. Emergency telephone number

Emergency telephone number : +1-703-527-3887 (ChemTrec-Transport)
+1 303-739-1378 (Medical)
: Poison Control Center:
Ireland: +353(1)8092166
United Kingdom: (+44) 844 892 0111

SECTION 2: Hazards identification

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006, as amended



Honeywell Solstice® L41y Refrigerant (R-452B)

000000020160

Version 1.1

Revision Date 28.03.2026

2.1. Classification of the substance or mixture

REGULATION (EC) No 1272/2008

Flammable gases Category 1B
H221 Flammable gas.
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	:	A red diamond-shaped pictogram with a black flame symbol inside.
Signal word	:	Danger
Hazard statements	:	H221 Flammable gas. H280 Contains gas under pressure; may explode if heated.
Precautionary statements	:	P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. P377 Leaking gas fire: Do not extinguish, unless leak can be stopped safely. P381 In case of leakage, eliminate all ignition sources. P410 + P403 Protect from sunlight. Store in a well-ventilated place.
Special labelling of certain products:	:	Contains fluorinated greenhouse gases

2.3. Other hazards

Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. Rapid evaporation of the liquid may cause frostbite. This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher. The substance/mixture does not contain

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006, as amended



Honeywell Solstice® L41y Refrigerant (R-452B)

000000020160

Version 1.1

Revision Date 28.03.2026

components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1. Substances

Not applicable

3.2. Mixtures

Chemical name	CAS-No. Index-No. REACH Registration Number EC-No.	Classification 1272/2008	Concentration	Remarks
Difluoromethane	75-10-5 01-2119471312-47 200-839-4	Flam. Gas 1B; H221 Press. Gas ; H280	67 %	
2,3,3,3-Tetrafluoroprop-1-ene	754-12-1 01-0000019665-61 468-710-7	Press. Gas Liquefied gas; H280 Flam. Gas 1B; H221	26 %	
Pentafluoroethane	354-33-6 01-2119485636-25 206-557-8	Press. Gas ; H280	7 %	

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.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice:

First aider needs to protect himself. Move out of dangerous area.

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006, as amended



Honeywell Solstice® L41y Refrigerant (R-452B)

000000020160

Version 1.1

Revision Date 28.03.2026

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:

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. As this product is a gas, refer to the inhalation section.

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

No data available

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

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SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006, as amended



Honeywell Solstice® L41y Refrigerant (R-452B)

000000020160

Version 1.1

Revision Date 28.03.2026

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media:

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

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

5.2. Special hazards arising from the substance or mixture

Contents under pressure.

Flammable.

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.

Rapid evaporation of the liquid may cause frostbite.

Fire may cause evolution of:

Hydrogen fluoride

Carbon oxides

Halogenated compounds

Carbonyl halides

5.3. Advice 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.

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 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. Ensure that the oxygen content is $\geq 19.5\%$.

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006, as amended



Honeywell Solstice® L41y Refrigerant (R-452B)

000000020160

Version 1.1

Revision Date 28.03.2026

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:

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. Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking. Protect cylinders from physical damage. 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:

Vapours may form explosive mixture with air. Container hazardous when empty. Keep product and empty container away from heat and sources of ignition. Electrical equipment should be protected to the appropriate standard.

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.

7.2. Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers:

Keep containers tightly closed in a dry, cool and well-ventilated place. Pressurized container: protect from sunlight and do not expose to temperatures exceeding 50 °C. Do not pierce or burn, even after use. Keep away from heat and sources of ignition. Protect cylinders from physical damage. Store away from incompatible substances. Storage rooms must be properly ventilated. Ensure adequate ventilation, especially in confined areas.

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006, as amended



Honeywell Solstice® L41y Refrigerant (R-452B)

000000020160

Version 1.1

Revision Date 28.03.2026

7.3. Specific end use(s)

no additional data available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limits:

Components	Basis / Value type	Value / Form of exposure	Exceeding Factor	Remarks
Difluoromethane	HONEYWELL TWA	2.200 mg/m3 1.000 ppm		We are not aware of any national exposure limit.
2,3,3,3-Tetrafluoroprop-1-ene	WEEL TWA	500 ppm		
2,3,3,3-Tetrafluoroprop-1-ene	HONEYWELL TWA	500 ppm		
Pentafluoroethane	HONEYWELL TWA	1.000 ppm		We are not aware of any national exposure limit.

HONEYWELL - Limit established by Solstice Advanced Materials
TWA - Time weighted average

DNEL/ PNEC-Values

Component	End-use/impact	Exposure duration	Value	Exposure routes	Remarks
Difluoromethane	Workers / Long-term systemic effects		7035 mg/m3	Inhalation	
Difluoromethane	Consumers / Long-term systemic effects		750 mg/m3	Inhalation	
2,3,3,3-Tetrafluoroprop-1-ene	Workers / Long-term systemic		950 mg/m3	Inhalation	

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006, as amended



Honeywell Solstice® L41y Refrigerant (R-452B)

000000020160

Version 1.1

Revision Date 28.03.2026

	effects				
2,3,3,3-Tetrafluoroprop-1-ene	Consumers / Long-term systemic effects		113,1 mg/m3	Inhalation	
2,3,3,3-Tetrafluoroprop-1-ene	Workers / Acute systemic effects		186400 mg/m3	Inhalation	
2,3,3,3-Tetrafluoroprop-1-ene	Consumers / Acute systemic effects		186400 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
Difluoromethane	Fresh water: 0,142 mg/l	Assessment factor: 1000
Difluoromethane	Fresh water sediment: 0,534 mg/kg dw	
2,3,3,3-Tetrafluoroprop-1-ene	Fresh water: 0,1 mg/l	
2,3,3,3-Tetrafluoroprop-1-ene	Marine water: 0,01 mg/l	
2,3,3,3-Tetrafluoroprop-1-ene	Fresh water sediment: 1,51 mg/kg	
2,3,3,3-Tetrafluoroprop-1-ene	Marine sediment: 0,151 mg/kg	
2,3,3,3-Tetrafluoroprop-1-ene	Soil: 1,49 mg/kg	
Pentafluoroethane	Fresh water: 0,1 mg/l	Assessment factor: 1000
Pentafluoroethane	Fresh water sediment: 0,6 mg/kg dw	

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006, as amended



Honeywell Solstice® L41y Refrigerant (R-452B)

000000020160

Version 1.1

Revision Date 28.03.2026

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, 511; safety shoes EN-ISO 20345.
Do not breathe gas.

Engineering measures

General room ventilation is adequate for storage and handling.
Perform filling operations only at stations with exhaust ventilation facilities.

Personal protective equipment

Respiratory protection:

In case of insufficient ventilation wear suitable respiratory equipment.
Wear a positive-pressure supplied-air respirator.

Hand protection:

Protective gloves against cold
(EN 511)
Gloves must be inspected prior to use.
Replace when worn.

Eye protection:

Tightly fitting safety goggles
Face-shield

Skin and body protection:

Wear suitable protective equipment.

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

- (a) Physical state : gaseous
(b) Colour : clear

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006, as amended



Honeywell Solstice® L41y Refrigerant (R-452B)

000000020160

Version 1.1

Revision Date 28.03.2026

	and colourless
(c) Odour	: slight ether-like
(e) Boiling point/boiling range	: not determined
(g) Lower and upper explosion limit	: Lower explosion limit 11,9 %(V) : Upper explosion limit No data available
(h) Flash point	: Not applicable
(i) Auto-ignition temperature	: No data available
(j) Decomposition temperature	: No data available
(k) pH	: Not applicable
(m) Solubility(ies)	: Water solubility: negligible
(o) Vapour pressure	: 1,42 MPa at 21,1 °C
(p) Density and / or relative density	: 1,01 g/cm ³
(q) Relative vapour density	: not determined (Air = 1.0)
(r) Particle characteristics	: No data available

9.2 Other Information

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006, as amended



Honeywell Solstice® L41y Refrigerant (R-452B)

000000020160

Version 1.1

Revision Date 28.03.2026

Polymer characteristics : No data available

Evaporation rate : not determined

SECTION 10: Stability and reactivity

10.1. Reactivity

Stable under normal conditions.

10.2. Chemical stability

No data available

10.3. Possibility of hazardous reactions

Hazardous polymerisation does not occur.

10.4. Conditions to avoid

Protect from heat/overheating.

Contains gas under pressure; may explode if heated.

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

Keep away from direct sunlight.

Some risk may be expected of corrosive and toxic decomposition products.

10.5. Incompatible materials

Potassium

Calcium

Powdered metals

Finely divided aluminium

Finely divided magnesium

Zinc

10.6. Hazardous decomposition products

Halogenated compounds

Hydrogen fluoride

Carbon oxides

Carbonyl halides

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006, as amended



Honeywell Solstice® L41y Refrigerant (R-452B)

000000020160

Version 1.1

Revision Date 28.03.2026

SECTION 11: Toxicological information

11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008

(a) Acute toxicity

Acute oral toxicity:

Not applicable

study technically not feasible

Acute dermal toxicity:

No data available

study technically not feasible

Acute inhalation toxicity:

LC50

Species: Rat

Value: > 520000 ppm

Exposure time: 4 h

Test substance: Difluoromethane (HFC-32)

LC50

Species: Rat

Value: > 400000 ppm

Exposure time: 4 h

Test substance: 2,3,3,3-Tetrafluoroprop-1-ene

Acute toxicity (other routes of administration):

No data available

(b) Skin corrosion/irritation:

Not applicable

study technically not feasible

(c) Serious eye damage/eye irritation:

Not applicable

study technically not feasible

(d) Respiratory or skin sensitisation:

Not applicable

study technically not feasible

(e) Germ cell mutagenicity:

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006, as amended



Honeywell Solstice® L41y Refrigerant (R-452B)

000000020160

Version 1.1

Revision Date 28.03.2026

Note: No data available

(f) Carcinogenicity:

Note: No data available

(h) STOT-single exposure:

No data available

(i) STOT - repeated exposure:

No data available

(j) Aspiration hazard:

Not applicable

11.2. Information on other hazards

Endocrine disrupting properties

No data available

Other information:

No data available

SECTION 12: Ecological information

12.1. Toxicity

Toxicity to fish:

LC50

Species: Cyprinus carpio (Carp)

Value: > 197 mg/l

Exposure time: 96 h

Method: OECD Test Guideline 203

Test substance: 2,3,3,3-Tetrafluoroprop-1-ene

Toxicity to aquatic plants:

EC50

Species: Scenedesmus capricornutum (fresh water algae)

Value: > 100 mg/l

Exposure time: 72 h

Method: OECD Test Guideline 201

Test substance: 2,3,3,3-Tetrafluoroprop-1-ene

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006, as amended



Honeywell Solstice® L41y Refrigerant (R-452B)

000000020160

Version 1.1

Revision Date 28.03.2026

Toxicity to aquatic invertebrates:

EC50

Species: Daphnia magna (Water flea)

Value: > 83 mg/l

Exposure time: 48 h

Test substance: 2,3,3,3-Tetrafluoroprop-1-ene

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. Endocrine disrupting properties

No data available

12.7. Other adverse effects

No data available

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Product:

Dispose according to legal requirements.

Packaging:

Legal requirements are to be considered in regard of reuse or disposal of used packaging materials

Further information:

Provisions relating to waste:

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

Regulation No. 1013/2006

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006, as amended



Honeywell Solstice® L41y Refrigerant (R-452B)

000000020160

Version 1.1

Revision Date 28.03.2026

For personal protection see section 8.

SECTION 14: Transport information

14.1 UN number or ID number

ADR/RID:3161

IMDG:3161

IATA:3161

14.2 UN proper shipping name

ADR/RID:LIQUEFIED GAS, FLAMMABLE, N.O.S.(DIFLUOROMETHANE, R-1234yf, PENTAFLUOROETHANE)

IMDG:LIQUEFIED GAS, FLAMMABLE, N.O.S.(DIFLUOROMETHANE, R-1234yf,PENTAFLUOROETHANE)

IATA:Liquefied gas, flammable, n.o.s.(Difluoromethane, R-1234yf, Pentafluoroethane)

14.3 Transport hazard class(es)

ADR/RID:2.1

IMDG: 2.1

IATA: 2.1

14.4 Packaging group

No data available

14.5 Environmental hazards

ADR/RID:no

Marine pollutant: no

14.6 Special precautions for user

IMDG Code segregation group according chapter 3.1.4.4 : NONE,

14.7 Maritime transport in bulk according to IMO instruments

No data available

SECTION 15: Regulatory information

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

Basis	Value	Remarks
Directive 2012/18/EC SEVESO III Listed in Regulation : P2: Flammable gases	Quantity: 10 t Quantity: 50 t	
Substances of very high concern (SVHC)		This product does not contain substances of very high concern according to Regulation (EC) No Article 57 above the respective

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006, as amended



Honeywell Solstice® L41y Refrigerant (R-452B)

000000020160

Version 1.1

Revision Date 28.03.2026

		regulatory 1907/2006 (REACH), concentration limit of ≥ 0.1 % (w/w).
Regulation (EC) No. 1907/2006, Annex XIV		Not listed
Regulation (EC) No. 1907/2006, Annex XVII Number in Regulation: 40		Listed

Global warming potential :
697

Other inventory information

USA. List of Active Substances on the Toxic Substances Control Act (TSCA) Chemical Substances Inventory, as amended

All substances listed as active on the TSCA inventory

Australian Inventory of Industrial Chemicals

All components are listed on the inventory, regulatory obligations/restrictions apply

Canada. Domestic Substances List (DSL), as amended

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. Inventory of Chemicals and Chemical Substances (PICCS)

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

Thailand. Existing Chemicals Inventory from FDA (TECI List)

On the inventory, or in compliance with the inventory

Taiwan Chemical Substance Inventory (TCSI)

On the inventory, or in compliance with the inventory

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006, as amended



Honeywell Solstice® L41y Refrigerant (R-452B)

000000020160

Version 1.1

Revision Date 28.03.2026

15.2 Chemical safety assessment

A Chemical Safety Assessment has not been carried out.

SECTION 16: Other information

Text of H-statements referred to under heading 3

Difluoromethane	:	H221	Flammable gas.
		H280	Contains gas under pressure; may explode if heated.
2,3,3,3-Tetrafluoroprop-1-ene	:	H280	Contains gas under pressure; may explode if heated.
		H221	Flammable gas.
Pentafluoroethane	:	H280	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

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.

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006, as amended



Honeywell Solstice® L41y Refrigerant (R-452B)

000000020160

Version 1.1

Revision Date 28.03.2026
