

SAFETY DATA SHEET

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

Honeywell

Solstice® 513A

000000022892

Version 2.2

Revision Date 20.12.2024

Supersedes 1

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

1.1. Product identifier

Product name : Solstice® 513A

SDS-number : 000000022892

Type of product : Mixture

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 Specialty Chemicals Seelze GmbH Wunstorfer Straße 40 30926 Seelze Germany	Honeywell International, Inc. 115 Tabor Road Morris Plains, NJ 07950-2546 USA
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Telephone : (49) 5137-999 0
For further information,
please contact: : SafetyDataSheet@Honeywell.com

1.4. Emergency telephone number

Emergency telephone number : +1-703-527-3887 (ChemTrec-Transport)
+1-303-389-1414 (Medical)
: Poison Control Center:
United Kingdom: (+44) 844 892 0111

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

REGULATION (EC) No 1272/2008

SAFETY DATA SHEET

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

Honeywell

Solstice® 513A

000000022892

Version 2.2


Revision Date 20.12.2024

Supersedes 1

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	
Hazard statements	:	H280	Contains gas under pressure; may explode if heated.
Precautionary statements	:	P260 P410 + P403	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray. 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 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

SAFETY DATA SHEET

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

Honeywell

Solstice® 513A

000000022892

Version 2.2

Revision Date 20.12.2024

Supersedes 1

Chemical name	CAS-No. Index-No. REACH Registration Number EC-No.	Classification 1272/2008	Concentration	Remarks
2,3,3,3-Tetrafluoroprop-1-ene	754-12-1 468-710-7	Press. Gas Liquefied gas; H280 Flam. Gas 1B; H221	56 %	
Norflurane	811-97-2 212-377-0	Press. Gas ; H280	44 %	

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.

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.

SAFETY DATA SHEET

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

Honeywell

Solstice® 513A

000000022892

Version 2.2

Revision Date 20.12.2024

Supersedes 1

Ingestion:

As this product is a gas, refer to the inhalation section. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Call a physician immediately.

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.

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.

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

SAFETY DATA SHEET

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

Honeywell

Solstice® 513A

000000022892

Version 2.2

Revision Date 20.12.2024

Supersedes 1

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 $\geq 19.5\%$.

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. 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:

SAFETY DATA SHEET

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

Honeywell

Solstice® 513A

000000022892

Version 2.2

Revision Date 20.12.2024

Supersedes 1

The product is not flammable. Can form a combustible mixture with air at pressures above atmospheric pressure.

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:

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. Store in original container.

Further information on storage conditions:

Keep away from direct sunlight.

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
2,3,3,3-Tetrafluoroprop-1-ene	WEEL TWA	500 ppm		
2,3,3,3-Tetrafluoroprop-1-ene	HONEYWELL TWA	500 ppm		
Norflurane	HONEYWELL TWA	1.000 ppm		
Norflurane	EH40 WEL TWA	4.240 mg/m ³ 1.000 ppm		

WEEL - US Workplace Environmental Exposure Level

SAFETY DATA SHEET

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

Honeywell

Solstice® 513A

000000022892

Version 2.2

Revision Date 20.12.2024

Supersedes 1

TWA - Time weighted average

DNEL/ PNEC-Values

Component	End-use/impact	Exposure duration	Value	Exposure routes	Remarks
2,3,3,3-Tetrafluoroprop-1-ene	Workers / Long-term systemic effects		950 mg/m3	Inhalation	
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	
Norflurane	Workers / Long-term systemic effects		13936 mg/m3	Inhalation	
Norflurane	Consumers / Long-term systemic effects		2476 mg/m3	Inhalation	

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

SAFETY DATA SHEET

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

Honeywell

Solstice® 513A

000000022892

Version 2.2

Revision Date 20.12.2024

Supersedes 1

		1000
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

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.

Personal protective equipment

Respiratory protection:

In case of insufficient ventilation wear suitable respiratory equipment.

Hand protection:

Glove material: Viton®

Break through time: > 480 min

Glove thickness: 0,7 mm

Vitoject® 890

Heat insulating gloves

Remarks:Supplementary note: The specifications are based on information and tests from similar substances by analogy.

Due to varying conditions (e.g.temperature or other strains) it must be considered that the usage of a chemical protective glove in practice may be much shorter than the permeation time determined in accordance with EN 374.

Since actual conditions of practical use often deviate from standardised conditions according EN 374 the glove manufacturer recommends to use the chemical protective glove in practice not longer than 50% of the recommended permeation time.

Manufacturer´s directions for use should be observed because of great diversity of types .

Suitable gloves tested according EN 374 are supplied e.g. from KCL GmbH, D-36124 Eichenzell, Vertrieb@kcl.de

Eye protection:

Safety glasses with side-shields conforming to EN166

Face-shield

SAFETY DATA SHEET

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

Honeywell

Solstice® 513A

000000022892

Version 2.2

Revision Date 20.12.2024

Supersedes 1

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

- | | | |
|-------------------------------------|---|--|
| (a) Physical state | : | gaseous |
| (b) Colour | : | clear
colourless |
| (c) Odour | : | slight
ether-like |
| (d) Melting point/freezing point | : | No data available |
| (e) Boiling point/boiling range | : | -29,2 °C |
| (f) Flammability | : | The product is not flammable. |
| (g) Lower and upper explosion limit | : | Lower explosion limit
No data available

Upper explosion limit
No data available |
| (h) Flash point | : | Not applicable |
| (i) Auto-ignition temperature | : | No data available |
| (j) Decomposition temperature | : | 250 °C
To avoid thermal decomposition, do not overheat. |
| (k) pH | : | Not applicable |
| (l) Viscosity, kinematic | : | No data available |

SAFETY DATA SHEET

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

Honeywell

Solstice® 513A

000000022892

Version 2.2

Revision Date 20.12.2024

Supersedes 1

- (m) Solubility(ies) : Water solubility:
No data available
- (n) Partition coefficient: n-
octanol/water : No data available
- (o) Vapour pressure : 0,637 MPa
at 21,1 °C
- (p) Density and / or relative
density : 1,15 g/cm³
at 21,1 °C
- (q) Relative vapour density : 3,83
(Air = 1.0)
- (r) Particle characteristics : No data available

9.2 Other Information

no additional data available

SECTION 10: Stability and reactivity

10.1. Reactivity

Stable under normal conditions.

10.2. Chemical stability

>250 °C

To avoid thermal decomposition, do not overheat.

10.3. Possibility of hazardous reactions

Hazardous polymerisation does not occur.

10.4. Conditions to avoid

Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50 °C.
Some risk may be expected of corrosive and toxic decomposition products.

SAFETY DATA SHEET

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

Honeywell

Solstice® 513A

000000022892

Version 2.2

Revision Date 20.12.2024

Supersedes 1

Can form a combustible mixture with air at pressures above atmospheric pressure.

10.5. Incompatible materials

Potassium
Calcium
Powdered metals
Finely divided aluminium
Finely divided magnesium
Zinc

10.6. Hazardous decomposition products

Halogenated compounds
Hydrogen fluoride
Carbonyl halides
Carbon oxides

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:

Not applicable
study technically not feasible

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

SAFETY DATA SHEET

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

Honeywell

Solstice® 513A

000000022892

Version 2.2

Revision Date 20.12.2024

Supersedes 1

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:

Route of exposure: Dermal

Not applicable, as this product is a gas.

study technically not feasible

(f) Carcinogenicity:

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

Note: Not classified as a human carcinogen. Substance not expected to be a carcinogen based on available data.

:

Species: Rat

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

Note: Not classified as a human carcinogen. Substance not expected to be a carcinogen based on available data.

(h) STOT-single exposure:

No data available

(i) STOT - repeated exposure:

Species: Rat

NOEL: 40000

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

Species: Rat

Application Route: Inhalation

Exposure time: 2 Weeks

NOEL: 50000

SAFETY DATA SHEET

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

Honeywell

Solstice® 513A

000000022892

Version 2.2

Revision Date 20.12.2024

Supersedes 1

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

Method: OECD Test Guideline 412

Species: Rat

Application Route: Inhalation

Exposure time: 4 Weeks

NOAEL: 50000 ppm

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

Method: OECD Test Guideline 412

Species: Rat

Application Route: Inhalation

Exposure time: 13 Weeks

NOAEL: 50000 ppm

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

Method: OECD Test Guideline 413

Species: Rabbit, male

Application Route: Inhalation

Exposure time: 28 d

NOEL: 500

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

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

NOEL: 1000

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

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: 10000 ppm

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

Note: highest exposure tested

(j) Aspiration hazard:

Not applicable, as this product is a gas.

SAFETY DATA SHEET

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

Honeywell

Solstice® 513A

000000022892

Version 2.2

Revision Date 20.12.2024

Supersedes 1

11.2. Information on other hazards

Endocrine disrupting properties

No data available

Other information:

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

12.1. Toxicity

Toxicity to fish:

LC50

semi-static test

Species: *Oncorhynchus mykiss* (rainbow trout)

Value: 450 mg/l

Exposure time: 96 h

Method: 92/69/EEC, C.1

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

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

No demonstrable toxic effect in saturated solution.

Toxicity to aquatic plants:

Growth rate

Species: *Selenastrum capricornutum* (green algae)

Value: > 118 mg/l

Exposure time: 72 h

Method: OECD Test Guideline 201

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

EC50

Species: *Scenedesmus capricornutum* (fresh water algae)

Value: > 100 mg/l

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® 513A

000000022892

Version 2.2

Revision Date 20.12.2024

Supersedes 1

Toxicity to Microorganisms:

EC10

Growth inhibition

Species: Pseudomonas putida

Value: > 730 mg/l

Exposure time: 6 h

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

Toxicity to aquatic invertebrates:

EC50

static test

Species: Daphnia magna (Water flea)

Value: 980 mg/l

Exposure time: 48 h

Method: EEC 92/69/V, C2

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

EC50

Species: Daphnia magna (Water flea)

Value: > 83 mg/l

Exposure time: 48 h

Method: OECD Test Guideline 202

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

12.2. Persistence and degradability

Biodegradability:

Biodegradation: 3 %

Exposure time: 28 d

Result: Not rapidly biodegradable

Method: OECD 301 D

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

Biodegradability:

Result: Not readily biodegradable.

Method: OECD Test Guideline 301F

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

12.3. Bioaccumulative potential

No data available

SAFETY DATA SHEET

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

Honeywell

Solstice® 513A

000000022892

Version 2.2

Revision Date 20.12.2024

Supersedes 1

12.4. Mobility in soil

No data available

12.5. Results of PBT and vPvB assessment

Substance is not persistent, bioaccumulative, and toxic (PBT).

Substance is not very persistent and very bioaccumulative (vPvB).

12.6. Endocrine disrupting properties

No data available

12.7. 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.

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

For personal protection see section 8.

SECTION 14: Transport information

14.1 UN number or ID number

ADR/RID:3163

IMDG:3163

IATA:3163

14.2 UN proper shipping name

ADR/RID:LIQUEFIED GAS, N.O.S.(R-1234yf, 1,1,1,2-TETRAFLUOROETHANE)

IMDG:LIQUEFIED GAS, N.O.S.(R-1234yf,1,1,1,2-TETRAFLUOROETHANE)

IATA:Liquefied gas, n.o.s.(R-1234yf, 1,1,1,2-Tetrafluoroethane)

SAFETY DATA SHEET

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

Honeywell

Solstice® 513A

000000022892

Version 2.2

Revision Date 20.12.2024

Supersedes 1

14.3 Transport hazard class(es)

ADR/RID: 2.2

IMDG: 2.2

IATA: 2.2

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

Global warming potential :

631

Other inventory information

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

Australia. Inventory of Industrial Chemicals (AIIC), as amended
On the inventory, or in compliance with the inventory

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)
Not in compliance with the inventory

SAFETY DATA SHEET

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

Honeywell

Solstice® 513A

000000022892

Version 2.2

Revision Date 20.12.2024

Supersedes 1

China. Inventory of Existing Chemical Substances (IECSC)

On the inventory, or in compliance with the inventory, or has been registered as new substance

New Zealand. Inventory of Chemicals (NZIoC), as published by ERMA New Zealand

Not in compliance with the inventory

Taiwan Chemical Substance Inventory (TCSI)

On the inventory, or in compliance with the inventory

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

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

Norflurane : 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

SAFETY DATA SHEET

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

Honeywell

Solstice® 513A

000000022892

Version 2.2

Revision Date 20.12.2024

Supersedes 1

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.
