

SAFETY DATA SHEET

According to Regulation (EC) No.1907/2006


HARP
INTERNATIONAL

Opteon™ yf (R1234yf)

Version: CLP01

Date: July 2016

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1. Identification of the substance / preparation and company / undertaking

Product name	HFO-1234yf, 2,3,3,3-Tetrafluoroprop-1-ene
REACH registration number	01-0000019665-61
Company	Harp International Ltd Gellihirion Industrial Estate Pontypridd Rhondda Cynon Taff CF37 5SX Tel: +44 (0) 1443 842255 Fax: +44 (0) 1443 841805 Email: harp@harpintl.com
Emergency phone number	+44 (0) 1270 502891 (24 hour)
Use	Refrigerant

2. Hazards identification

Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008/EC (CLP/GHS)

Flammable gases 1

H220 Extremely flammable gas

H280 Contains gas under pressure; may explode if heated

Classification according to Directive 67/548/EEC & 1999/45/EC

F+ Extremely flammable

R12 Extremely flammable

Label elements

Labelling Pictograms



Signal word

Danger

Hazard statements

H220

Extremely flammable gas

H280

Contains gas under pressure; may explode if heated

Precautionary statements

Precautionary statements

P281

Use personal protective equipment as required

P210

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

P260

Do not breathe dust/fumes/gas/mist/vapours/spray

P308 + P313

If exposed or concerned: Get medical advice/attention

P410 + P403

Protect from sunlight. Store in a well-ventilated place

P377

Leaking gas fire: Do not extinguish, unless leak can be stopped safely

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P381 Eliminate all ignition sources if safe to do so

Potential health effects

Skin	Rapid evaporation of the liquid may cause frostbite
Eyes	May irritate eyes
Ingestion	Unlikely route of exposure
Inhalation	High vapour concentrations can cause headaches, dizziness, drowsiness and nausea and may lead to unconsciousness
Chronic exposure	None known
General advice	Warning: Container under pressure

Potential environmental effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal

3. Composition / information on ingredients

Substance / mixture:	Substance
CAS number	754-12-1
EC No (from EINECS)	468-710-7

4. First aid measures

Description of first aid measures

General advice	First aider needs to protect himself. Wear self-contained breathing apparatus if entering contaminated area. Take off all contaminated clothing immediately.
Inhalation	Remove to fresh air and seek medical aid. If breathing is irregular or stopped, administer artificial respiration. If unconscious place in recovery position and seek medical advice.
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. Wash contaminated clothing before reuse. Consult a physician.
Eye contact	Protect unharmed eye. Immediately flush eyes thoroughly with water for at least 15 minutes. Call a physician immediately.
Ingestion	Rinse mouth. Call a physician immediately.
Notes to physician	
Treatment	Adrenaline derivatives are contra-indicated. Treat symptomatically.

5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media	Alcohol-resistant foam, dry powder. Use water spray or fog to control fire fumes.dioxide.
Unsuitable extinguishing media	Carbon dioxide

Special hazards arising from the substance or mixture

Specific hazards	Exposure to fire may cause cylinder to explode. Extremely flammable. Some risk may be expected of corrosive and
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toxic decomposition products. In case of fire, hazardous decomposition products may be produced such as carbon monoxide, hydrogen halides, carbonyl halides, pyrolysis products containing fluoride. Cool closed containers exposed to fire with water spray. Heating will cause pressure rise with risk of bursting and subsequent explosion.

Advice for fire fighters

Specific methods

If possible, stop flow of product. Move container away or cool with water from a protected position. Do not extinguish a leaking gas flame unless absolutely necessary. Spontaneous/explosive re-ignition may occur. Extinguish any other fire. Prevent water used in emergency cases from entering sewers and drainage systems.

Special protective equipment

Normal firefighters' equipment consists of an appropriate SCBA (open-circuit positive pressure compressed air type) in combination with fire kit. Equipment and clothing to the following standards will provide a suitable level of protection for firefighters.

EN 469:2005: Protective clothing for firefighters. Performance requirements for protective clothing for firefighting., EN 137 Respiratory protective devices — Self-contained open-circuit compressed air breathing apparatus with full face mask — Requirements, testing, marking., EN 15090 Footwear for firefighters., EN 443 Helmets for firefighting in buildings and other structures., EN 659 Protective gloves for firefighters.

Further information

In case of fire, evacuate area. Fight remotely due to the risk of explosion.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

Consider the risk of potentially explosive atmospheres. Evacuate area. Ensure adequate air ventilation. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. Eliminate ignition sources. Prevent from entering sewers, basements and work pits, or any place where its accumulation can be dangerous.

Environmental precautions

Try to stop release. The product evaporates readily. Prevent product from entering drains.

Methods and materials for containment and cleaning up

Eliminate all sources of ignition. Use low-sparking hand tools and explosion proof electrical equipment. Allow to evaporate.

Additional advice

Inform the responsible authorities in case of gas leakage or of entry into waterways, soil or drains. Pay attention to the spread of gases especially at ground level (gas is heavier than air) and to the direction of the wind.

Reference to other sections

See also sections 8 and 13.

7. Handling and storage

Precautions for safe handling

Exhaust ventilation at the object is necessary. Pressurised container: protect from sunlight and do not expose to temperatures exceeding 50°C. Do not pierce or burn, even after use. Use suitably rated explosion-proof equipment. Take precautionary measures against static discharges. Do not smoke while handling product. Consider the use of only non-sparking tools. Protect containers from physical damage; do not drag, roll, slide or drop. When moving containers, even for short distances, use appropriate equipment eg. trolley, hand truck, fork truck etc. Never attempt to repair or modify container valves or safety relief devices. Damaged valves should be reported immediately to the supplier. Never use direct flame or electrical heating

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devices to raise the pressure of a container. Refer to supplier's handling instructions.

Advice on protection against fire and explosion

Keep product and empty container away from heat and sources of ignition. Fire or intense heat may cause violent rupture of packages. Use suitably rated equipment.

Hygiene measures

Provide adequate ventilation. Do not smoke. When using, do not eat or drink.

Conditions for safe storage, including any incompatibilities

Keep containers tightly closed in a cool, well-ventilated place. Containers should be protected against falling down. Protect from warmth. Do not store at temperatures exceeding 50°C. Keep away from direct sunlight.

8. Exposure controls / personal protection

Control parameters

No occupational exposure limit

Derived No Effect Levels (DNEL)

Components	Exposure	Type	Value	Population	Effects
2,3,3,3-Tetrafluoroprop-1-ene	Long term inhalation	DNEL	273mg/m ³	Workers	Systemic

Predicted No Effect Concentrations (PNEC)

Type	Environmental compartment	Value
PNEC	Fresh water	0.1 mg/l
PNEC	Intermittent release	1.0 mg/l

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; safety shoes EN-ISO 20345.

Environmental exposure controls

Handle in accordance with local environmental regulations and good industrial practices.

Engineering measures

Highly effective exhaust ventilation.

Personal protective equipment

Respiratory protection

Remarks: In case of insufficient ventilation, wear suitable respiratory equipment to EN 136.

Hand protection

Wear suitable gloves to EN 374 when handling.

Eye protection

Wear suitable eye protection to EN 166 when handling.

Skin and body protection

Wear suitable protective equipment

9. Physical and chemical properties

Form

Compressed liquefied gas

Appearance/colour

Colourless

Odour

Slight, ethereal odour

Molecular weight

114 g/mol

Boiling point

-29.4°C

Flash point

Not applicable

Flammability (solid, gas)

Extremely flammable gas. Method: Flammability (gases)

Auto-ignition temperature

405°C

Lower explosion limit

6.2 % (V) lower flammability limit

Upper explosion limit

12.3 % (V) upper flammability limit

Vapour pressure

4.8 bar at 20°C

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Relative density, gas (Air = 1)	4
pH	7
Solubility in water	198.2 mg/l at 24°C Method: 92/69/EEC, A.6
Partition coefficient (n-octanol/water)	log Pow 2.15 Method: 92/69/EEC, A.8
Evaporation rate	Not determined
Oxidising properties	Not applicable
Explosive properties	Explosive acc. EU legislation: Not explosive. Explosive acc. transp. reg.: Not explosive.

10. Stability and reactivity

Reactivity	Unreactive under normal conditions
Chemical stability	Stable under normal conditions
Possibility of hazardous reactions	Can form potentially explosive atmosphere in air. May react violently with oxidants.
Conditions to avoid	Do not pierce or burn, even after use. Do not spray on a naked flame or any incandescent material. Avoid heat, flames and sparks. No smoking.
Materials to avoid	May react with alkaline and alkaline-earth metals. May react with light metals. May react with aluminium.
Hazardous decomposition products	Risk of formation of toxic pyrolysis products containing fluorine. Carbon monoxide, carbon dioxide, carbonyl halides, hydrogen halides.

11. Toxicological information

Information on toxicological effects

Acute oral toxicity	Not applicable
Acute dermal toxicity	Not applicable
Acute inhalation toxicity	LC50/rat, value: >405000 ppm. Exposure time: 4 h
Skin irritation	Not classified as an irritant
Eye irritation	Not classified as an irritant
Sensitisation	This substance is not classified as a sensitizer.
Repeated dose toxicity	Rat, exposure route: inhalation. No known effects from this product. No known effects from this product.
Genetic toxicity in vitro	Test type: Ames test in vitro: Method: OECD Test Guideline 471 Mutagenic
Genetic toxicity in vivo	Test type: Chromosome aberration Method: OECD Test Guideline 474 Mammalian Erythrocyte Micronucleus Test) Result: Negative.
Assessment mutagenicity	Not genotoxic overall.
Assessment carcinogenicity	No evidence of carcinogenic effects.
Toxicity to reproduction/fertility	Species: Rat. Route of application: Inhalation. Value type: NOAEL. Value: 50.000 ppm
Assessment toxicity to reproduction	No indication of toxic effects.
Developmental toxicity/teratogenicity	Species: Rat. Route of application: Inhalation. Value type: NOAEC (maternal toxicity). Value: ≤ 50000 ppm. Method: OECD Test Guideline 414 (Prenatal Developmental Toxicity Study).
Assessment teratogenicity	No indication of teratogenic effects.
Other relevant toxicity information	Test type: Cardiac sensitisation threshold limit 120000 ppm

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12. Ecological information

Ecotoxicity effects

		Species	Value	Exposure time	Comment
Toxicity to fish	LC50	Cyprinus carpio (Carp)	>197 mg/l	96 h	Not harmful to fish
Toxicity to aquatic plants	EC50	Scenedesmus capricornutum (fresh water algae)	>100 mg/l	72 h	Not harmful to algae
Acute toxicity to aquatic invertebrates	EC50	Daphnia magna (water flea)	>100 mg/l	48 h	Not harmful to invertebrates

Persistence and degradability

Biodegradability

Result: Not readily biodegradable

Biodegradation

Biodegradation: < 5 %; Exposure time: 28 d; Method: OECD Test Guideline 301F (Manometric Respirometry Test)

Further information

Additional ecological information

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Bio accumulative potential

Study scientifically unjustified.

Mobility in soil

Study scientifically unjustified.

Results of PBT and vPvB assessment

Not classified as PBT or vPvB.

Other adverse effects

Global Warming Potential GWP

When discharged in large quantities may contribute to the greenhouse effect. GWP = 4

Ozone Depleting Potential ODP

ODP = 0

13. Disposal considerations

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; 91/689/EEC Regulation No. 1013/2006

14. Transport information

ADR/RID

Class

2

Classification code

2F

UN number

3161

Labels

2.1

Proper shipping name

LIQUIFIED GAS, FLAMMABLE, N.O.S.
(2,3,3,3-TETRAFLUOROPROP-1-ENE)

Hazard number

23

Environmentally hazardous

No

IATA

Class

2.1

UN number

3161

Hazard labels

2.1

Proper shipping name

LIQUIFIED GAS, FLAMMABLE, N.O.S.
(2,3,3,3-TETRAFLUOROPROP-1-ENE)

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IMDG

Class	2.1
UN number	3161
Hazard labels	2.1
Proper shipping name	LIQUIFIED GAS, FLAMMABLE, N.O.S. (2,3,3,3-TETRAFLUOROPROP-1-ENE)
EmS number	F-D,S-U
Marine pollutant	No

Packaging group instructions P200

15. Regulatory information

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

Other inventory information

Country	Legislation	Information
US	Toxic Substances Control Act	On TSCA inventory
Australia	Industrial Chemical (Notification & Assessment) Act	Not in compliance with inventory
Canada	Canadian Environmental Protection Act (CEPA)	This product contains the following components that are not on the Canadian DSL or NDSL lists
	Domestic Substances List (DSL) (Can. Gaz. Part II, Vol.144)	
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	Not in compliance with inventory
China	Inventory of Existing Chemical Substances	Not in compliance with inventory
New Zealand	Inventory of Chemicals (NZIoC), as published by ERMA New Zealand	Not in compliance with inventory

16. Other information

Abbreviations

EC	European Community
CAS	Chemical Abstract Service
WEL	Workplace Exposure Limit
MAK	Maximale Arbeitsplatz-Konzentration
AGW	Arbeitsplatzgrenzwert
STEL	Short Term Exposure Limit

Note

When using this document care should be taken as the decimal sign and its position complies with rules for the structure and drafting of international standards and is a comma on the line. As an example 2,000 is two (to three decimal places) and not two thousand, whilst 1.000 is one thousand and not one (to three decimal places).

This datasheet was prepared in accordance with Regulation (EC) No. 1907/2006.

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