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

1.1. Product identifier

Trade name	R454A (DuPont™ Opteon® XL40)
Chemical description	Refrigerant mixture HFC-HFO (2,3,3,3-Tetrafluoropropene, Difluoromethane)
CAS N°	--
CE N°	--
Index N°	--
Registration n°	--
Chemical formula	(CH ₂ F ₂ , C ₃ H ₂ F ₄)

1.2. Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses	Industrial and professional Test gas/Calibration gas Use for manufacture of electronic/photovoltaic components Use as refrigerant Laboratory use Contact supplier for more information on uses
Uses advised against	Consumer use not recommended

1.3. Details of the supplier of the safety data sheet

Company identification	MULTIGAS Route de l'Industrie 102 CH-1564 Domdidier
Phone number	+41 (0) 26 676 94 94
E-mail address	info@multigas.ch

1.4. Emergency telephone numbers

145 (Toxicology Centre Zurich) or +41 (0) 44 251 51 51
 +41 (0) 26 676 94 94 (Multigas)


SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Hazards Flammable gases, Category 1

H220

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Gases under pressure : Liquefied gas

H280

For the complete H-sentences texts mentioned in that chapter, refer to Section 16

2.2. Label elements

Labelling according to Regulation (EC) No. 1272/2008 [CLP]

Hazard pictograms		
	GHS02	GHS04
Signal word	Danger	
Hazard statements		
	H220	Extremely flammable gas
	H280	Contains gas under pressure; may explode if heated
Precautionary statements		
	P210	Keep away from heat/sparks/open flames/hot surfaces. — No smoking
	P377	Leaking gas fire: Do not extinguish, unless leak can be stopped safely
	P381	Eliminate all ignition sources if safe to do so
	P410+403	Protect from sunlight. Store in a well-ventilated place

2.3. Other hazards

None


SECTION 3: Composition/information on ingredients

3.1. Substances

Name	Product identifier	Concentration	Classification
2,3,3,3-Tetrafluoropropene (R1234yf)	(CAS-No.) 754-12-1 (EC-No.) 468-710-7 (EC Index-No.) --- (Registration-No.) 01-0000019665-61	63 – 67% %	Flam. Gas 1, H220 Press. Gas (Liq.), H280
Difluoromethane (R32)	(CAS-No.) 75-10-5 (EC-No.) 200-839-4 (EC Index-No.) --- (Registration-No.) 01-2119471312-47	33 - 37%	Flam. Gas 1, H220 Press. Gas (Liq.), H280

For the complete H-sentences texts mentioned in that chapter, refer to Section 16

Contains no other components or impurities which will influence the classification of the product

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3.2. Mixtures

Not established

SECTION 4: First aid measures

4.1. Description of first aid measures

General advice	See a doctor. Show this safety data sheet to the attending physician
In case of inhalation	In case of inhalation, remove the person from the contaminated area. In case of respiratory arrest, give artificial respiration. See a doctor
In case of skin contact	Frostbite should be treated like thermal burns: Immediate, abundant and prolonged washing with water. Consult a doctor
In case of eyes contact	Immediate washing, abundant and prolonged with water. If irritation persists, consult a doctor
In case of ingestion	Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. See a doctor

4.2. Most important symptoms and effects, both acute and delayed

May cause asphyxiation at high concentrations. Symptoms may include loss of consciousness or motor skills. The victim may not be aware of the asphyxia
Refer to section 11

4.3. Indication of any immediate medical attention and special treatment needed

Do not give adrenaline or similar drugs

SECTION 5: Firefighting measures

5.1. Extinguishing media


Suitable extinguishing media	Water spray or water mist. Dry powder. Carbon dioxide. Foam
Unsuitable extinguishing media	Do not use water jet

5.2. Special hazards arising from the substance or mixture

Specific hazards	In case of fire or excessive heat, hazardous combustion products may be produced Exposure to fire may cause containers to rupture/explode
Hazardous combustion products	In case of fire or excessive heat, hazardous combustion products may be produced such as : carbonyl fluoride, carbon monoxide, hydrogen fluoride

5.3. Additional information

Cool endangered receptacles with water spray jet from a protected position

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SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Avoid breathing vapours, spray mists or gases
 Provide adequate ventilation
 Evacuate personnel to a safe place
 Personal protective equipment, see section 8

6.2. Environmental precautions

-

6.3. Methods and material for containment and cleaning up

Ventilate the area

6.4. Reference to other sections

See also sections 8 and 13

SECTION 7: Handling and storage

7.1. Precautions for safe handling


Avoid contact with skin and eyes
 Avoid breathing vapours or mist
 Keep away from sources of ignition - No smoking
 Take measures to avoid the accumulation of electrostatic charges
 For precautions, see section 2.2

7.2. Conditions for safe storage, including any incompatibilities

Store in a cool place. Keep container tightly closed in a dry and well-ventilated place
 Content under pressure

7.3. Specific end use(s)

None

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SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Components with occupational exposure limits

Component	CAS N°	Exposure value type	Control parameter	Source
2,3,3,3-Tetrafluoropropene (R1234yf)	754-12-1	TWA	-	No limit value of exposure to workstations
			-	
		OEL	-	
			-	
Difluoromethane (R32)	75-10-5	TWA	-	No limit value of exposure to workstations
			-	
		OEL	-	
			-	


8.2. Exposure controls

8.2.1. Appropriate engineering controls

Provide adequate general and local exhaust ventilation
 Gas detectors should be used when flammable / toxic gases / vapours are likely to be released

8.2.2. Individual protection measures, e.g. personal protective equipment

- Eye/face protection** Wear goggles and a face shield when transfilling or breaking transfer connections. Standard EN 166
- Skin / hand protection** Wear protective gloves when handling gas cylinders Standard EN 388- Protective gloves against mechanical hazards
 The selected protective gloves have to satisfy the specifications of EU Directive 89/686 / EEC and the standard EN 374 derived from it
 For short-term use
 Material: Fluoroelastomer
 Penetration time:> 480 min
 Glove thickness: 0.7 mm
 For long-term use
 Material: Fluoroelastomer
 Penetration time:> 480 min
 Glove thickness: 0.7 mm
 Have appropriate, chemical-resistant protective clothing ready for use in emergencies
- Respiratory protection** Self-contained breathing apparatus (SCBA) or positive pressure air mask must be used in oxygenated atmospheres. Standard EN 137 - Self-contained compressed air device with a full face mask

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8.2.3. Environmental exposure controls

-

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance

- Physical state at 20°C / 101.3kPa Gas
- Colour Colourless

Odour No data available

Odour threshold No data available

pH No data available

Melting point / Freezing point No data available

Boiling point -48.3°C

Flash point No data available

Evaporation rate No data available

Flammability (solid, gas) Flammable

Explosive limits 8 – 15 %

Vapour pressure [20°C] 11.8 bar

Vapour pressure [50°C] 24.4 bar

Vapour density No data available

Relative density, liquid (water=1) 1

Relative density, gas (air=1) 2.8

Water solubility No data available

Partition coefficient No data available

n-octanol/water (Log Kow)

Auto-ignition temperature No data available

Decomposition temperature No data available

Viscosity No data available

Explosive properties No data available


Oxidising properties No data available

9.2. Other information

Molar mass 80.47 g/mol

Critical temperature [°C] 82°C

Relative vapour density Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level

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SECTION 10: Stability and reactivity

10.1. Reactivity

No reactivity hazard other than the effects described in sub-sections below

10.2. Chemical stability

Stable under recommended storage conditions

10.3. Possibility of hazardous reactions

May react violently with oxidants
May form an explosive mixture with air

10.4. Conditions to avoid

Keep away from heat and sources of ignition. Avoid contact with flames and red metal surfaces. Do not smoke

10.5. Incompatible materials

Air, oxidizers, finely divided metal powders, strong oxidizers
For more information on compatibility, refer to ISO 11114


10.6. Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced

SECTION 11: Toxicological information

11.1. Chemical safety assessment

Acute toxicity	No toxicological effects expected with this product if exposure limit values are not exceeded
Skin corrosion/irritation	No data available
Serious eye damage/irritation	No data available
Respiratory or skin sensitisation	No data available
Germ cell mutagenicity	No data available
Carcinogenicity	No data available
Reproductive toxicity	No data available
STOT-single exposure – Target organ(s)	No data available
STOT-repeated exposure	No data available
Ingestion hazard	No data available

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SECTION 12: Ecological information

12.1. Toxicity

Assessment

The classification criteria are not met

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

PBT / vPvB assessment is not available because the chemical safety assessment is not required / is not conducted

12.6. Other adverse effects

Contains fluorinated greenhouse gases
When discharged in large quantities may contribute to the greenhouse effect

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Product

Must not be released into the atmosphere
Burn in a chemical incinerator equipped with an afterburner and scrubber
Return to the supplier the product not consumed in its original container

Contaminated container

Dispose of as unused product
Contact the supplier if instructions are required

OMoD Code

14 06 01
Solvent, refrigerant and aerosol propellant or organic foam wastes:
Chlorofluorocarbons, HCFCs, HFCs

SECTION 14: Transport information

14.1. UN number

Transport par road/rail ADR / RID	Transport by sea IMDG	Transport by air IATA
3161	3161	3161

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14.2. UN proper shipping name

Transport par road/rail ADR / RID	Transport by sea IMDG	Transport by air IATA
LIQUEFIED GAS, FLAMMABLE, N.O.S. (2,3,3,3-Tetrafluoropropene, Difluoromethane) R454A	LIQUEFIED GAS, FLAMMABLE, N.O.S. (2,3,3,3-Tetrafluoropropene, Difluoromethane) R454A	LIQUEFIED GAS, FLAMMABLE, N.O.S. (2,3,3,3-Tetrafluoropropene, Difluoromethane) R454A

14.3. Transport hazard class(es)

Labelling



ADR/RID
IMDG
IATA

2.1 Flammable gases

14.4. Packing group

ADR/RID
IMDG
IATA

Not established

14.5. Environmental hazards

ADR/RID None
IMDG None
ICAO-TI / IATA-DGR None

14.6. Special precautions for user

No data available

14.7. Transport in bulk according to Annex II of Marpol and the IBC Code

Not applicable


SECTION 15: Regulatory information

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

This safety data sheet complies with the requirements of Regulation (CE) No. 1907/2006

15.2. Chemical safety assessment

A CSA has not been made yet

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SECTION 16: Other information

Indication of changes	Revised safety data sheet in accordance with commission regulation (EU) No 2015/830
Abbreviations and acronyms	<p>ADR : European Agreement concerning the International Carriage of Dangerous Goods by Road</p> <p>CAS : Chemical Abstract Service number (USA)</p> <p>CLP : Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008</p> <p>CSA : Chemical Safety Assessment</p> <p>EIGA : European Industrial Gases Association</p> <p>EINECS : European Inventory of Existing Commercial Chemical Substances</p> <p>EN : European Standard</p> <p>ATE : Acute Toxicity Estimate</p> <p>IATA : International Air Transport Association</p> <p>IMDG Code : International Maritime Dangerous Goods Code</p> <p>LC50 : Lethal Concentration to 50 % of a test population</p> <p>OMoD : Swiss Ordinance on the movement of waste</p> <p>PBT : Persistent, Bioaccumulative and Toxic</p> <p>PPE: Personal Protection Equipment</p> <p>REACH : Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (EC) No 1907/2006</p> <p>RID : Regulations concerning the international carriage of dangerous goods by rail</p> <p>RMM : Risk Management Measures</p> <p>STOT-SE : Specific Target Organ Toxicity - Single Exposure</p> <p>UN : United Nations</p> <p>vPvB : Very Persistent and Very Bioaccumulative</p> <p>WGK: Water Hazards Class</p>

Full text of H, EUH and P statements used in sections 2 and 3

Hazard statements

H220	Extremely flammable gas
H280	Contains gas under pressure; may explode if heated

Precautionary statements

P210	Keep away from heat/sparks/open flames/hot surfaces. — No smoking
P377	Leaking gas fire: Do not extinguish, unless leak can be stopped safely
P381	Eliminate all ignition sources if safe to do so
P410+403	Protect from sunlight. Store in a well-ventilated place

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Details given in this document have been prepared based on the most available reliable documents and are believed to be correct at the time of going to press

They do not claim to be exhaustive and should be considered as a guide