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

1.1. Product identifier

Trade name	R452B (DuPont™ Opteon® XL55)		
Chemical description	Refrigerant mixture HFC-HFO Tetrafluoropropene, Pentafluoroethane)	(Difluoromethane,	2,3,3,3-
CAS N°	--		
CE N°	--		
Index N°	--		
Registration n°	--		
Chemical formula	(CH ₂ F ₂ , C ₃ H ₂ F ₄ , C ₂ HF ₅)		

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
Difluoromethane (R32)	(CAS-No.) 75-10-5 (EC-No.) 200-839-4 (EC Index-No.) --- (Registration-No.) 01-2119471312-47	65 – 69%	Flam. Gas 1, H220 Press. Gas (Liq.), H280
2,3,3,3-Tetrafluoropropene (R1234yf)	(CAS-No.) 754-12-1 (EC-No.) 468-710-7 (EC Index-No.) --- (Registration-No.) 01-0000019665-61	24 – 28%	Flam. Gas 1, H220 Press. Gas (Liq.), H280

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Pentafluoroethane (R125)	(CAS-No.) 354-33-6 (EC-No.) 206-557-8 (EC Index-No.) --- (Registration-No.) 01-2119485636-25	5.5 – 8.5%	Press. Gas (Liq.), H280
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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

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
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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

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
Difluoromethane (R32)	75-10-5	TWA	-	No limit value of exposure to workstations
			-	
		OEL	-	
			-	
2,3,3,3-Tetrafluoropropene (R1234yf)	754-12-1	TWA	-	No limit value of exposure to workstations
			-	
		OEL	-	
			-	
Pentafluoroethane (R125)	354-33-6	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

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Respiratory protection Have appropriate, chemical-resistant protective clothing ready for use in emergencies

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

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 -51°C

Flash point No data available

Evaporation rate No data available

Flammability (solid, gas) Flammable

Explosive limits 12 – 23.3%

Vapour pressure [20°C] 14 bar

Vapour pressure [50°C] 29.5 bar

Vapour density No data available

Relative density, liquid (water=1) 1.01

Relative density, gas (air=1) 2.51

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 72.9 g/mol

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Critical temperature [°C]

75.7°C

Relative vapour density

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

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

Alkaline and alkaline earth metals, Strong oxidizers, Finely divided metals
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

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Ingestion hazard

No data available

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


Eliminate as unused product

Contact the supplier if instructions are needed

OMoD Code

14 06 01

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

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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

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. (Difluoromethane, 2,3,3,3-Tetrafluoropropene, Pentafluoroethane) R452B	LIQUEFIED GAS, FLAMMABLE ; N.O.S. (Difluoromethane, 2,3,3,3-Tetrafluoropropene, Pentafluoroethane) R452B	LIQUEFIED GAS, FLAMMABLE ; N.O.S. (Difluoromethane, 2,3,3,3-Tetrafluoropropene, Pentafluoroethane) R452B

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

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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


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

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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

Disclaimer of liability

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