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

### 1.1. Product identifier

Trade name	R452A (DuPont™ Opteon® XP44)
Chemical description	Refrigerant mixture HFC-HFO (Pentafluoroethane, 2,3,3,3-Tetrafluoropropene, Difluoromethane)
CAS N°	-
CE N°	-
Index N°	-
Registration n°	-
Chemical formula	CH <sub>2</sub> F <sub>2</sub> , C <sub>3</sub> H <sub>2</sub> F <sub>4</sub> , C <sub>2</sub> HF <sub>5</sub>

### 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	For use by industrial or professional users only

### 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	<a href="mailto:info@multigas.ch">info@multigas.ch</a>

### 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]

Gases under pressure : Liquefied gas

H280

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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



GHS04

Signal word

Warning

Hazard statements

H280 Contains gas under pressure; may explode if heated

Precautionary statements

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
Pentafluoroethane (R125)	(CAS-No.) 354-33-6 (EC-No.) 206-557-8 (EC Index-No.) --- (Registration-No.) 01-2119485636-25	59%	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	30 %	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	11%	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

<b>General advice</b>	See a doctor. Show this safety data sheet to the attending physician
<b>In case of inhalation</b>	In case of inhalation, remove the person from the contaminated area. In case of respiratory arrest, give artificial respiration. See a doctor
<b>In case of skin contact</b>	Frostbite should be treated like thermal burns: Immediate, abundant and prolonged washing with water. Consult a doctor
<b>In case of eyes contact</b>	Immediate washing, abundant and prolonged with water. If irritation persists, consult a doctor
<b>In case of ingestion</b>	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


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

### 5.2. Special hazards arising from the substance or mixture

<b>Specific hazards</b>	In case of fire or excessive heat, hazardous combustion products may be produced Exposure to fire may cause containers to rupture/explode
<b>Hazardous combustion products</b>	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
Pentafluoroethane (R125)	354-33-6	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	-	
			-	
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 long-term use**

Material: Fluoroelastomer  
 Penetration time: 480 min  
 Glove thickness: 0.7 mm

**For short-term use**

Material: Fluoroelastomer  
 Penetration time: 480 min  
 Glove thickness: 0.7 mm

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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

**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** Slightly ethereal

**Odour threshold** No data available

**pH** No data available

**Melting point / Freezing point** No data available

**Boiling point** -47°C

**Flash point** No data available

**Evaporation rate** No data available

**Flammability (solid, gas)** Non-flammable

**Explosive limits** No data available

**Vapour pressure [20°C]** 11.5 bar

**Vapour pressure [50°C]** 24 bar

**Vapour density** No data available

**Relative density, liquid (water=1)** 1.15

**Relative density, gas (air=1)** 3.6

**Water solubility** Slightly soluble in water

**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** 103.5 g/mol

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Critical temperature [°C]	74.9°C
Critical pressure	40 bar
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

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STOT-repeated exposure No data available

Ingestion hazard No data available

### **11.2 Information on other hazards**

The substance/mixture does not have endocrine disrupting properties

## 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. Endocrine-disrupting properties**

No data available

### **12.7. Other adverse effects**


Contains fluorinated greenhouse gas(es)  
 Global Warming Potential (GWP) : (CO<sub>2</sub> = 1) : 2140  
 Ozone Depletion Potential (ODP) : Value : 0 (R-11 = 1)  
 May contribute to the greenhouse effect when discharged in large quantities. For quantities, see bottle label

## 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



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**Contaminated container**

Return the unused product in its original container to the supplier

**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
1078	1078	1078

### 14.2. UN proper shipping name

Transport par road/rail ADR / RID	Transport by sea IMDG	Transport by air IATA
REFRIGERANT GAS ; N.O.S. (REFRIGERANT GAS R 452A)	REFRIGERANT GAS ; N.O.S. (REFRIGERANT GAS R 452A)	REFRIGERANT GAS ; N.O.S. (REFRIGERANT GAS R 452A)

### 14.3. Transport hazard class(es)

**Labelling**



**ADR/RID  
IMDG  
IATA**

2.2 : Non-flammable, non-toxic 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

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#### **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

### **SECTION 16: Other information**

<b>Indication of changes</b>	Revised safety data sheet in accordance with commission regulation (EU) No 2015/830
<b>Abbreviations and acronyms</b>	<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**

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**Hazard statements**

H280 Contains gas under pressure; may explode if heated

**Precautionary statements**

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