

SECTION 1: Identification of the substance/mixture and of the company/undertaking**1.1. Product identifier****Name of product**

R 452A

Art-Nr(n): 0093

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

Restricted to professional users.

Recommended intended purpose(s)

Refrigerant.

1.3. Details of the supplier of the safety data sheet**Manufacturer/distributor**

S. Zukausko str. 11, Ramučiai, Kaunas district,

LT - 54464, Lithuania

Phone + 370 37 373248

Fax. + 370 37 373198

E-mail: info@brgroup.eu

www.brgroup.eu

1.4. Emergency telephone number**Emergency advice**

The Poison Information Bureau

Siltnamų str. 29, LT-2043 Vilnius

Phone +370 5 2362052;

Fax. +370 5 236 21 42,

E-mail.: info@tox.lt

SECTION 2: Hazards identification**2.1. Classification of the substance or mixture****Classification according to Regulation (EC) No 1272/2008 [CLP/GHS]**Hazard classes and Hazard
categories

Hazard Statements

Classification procedure

Liquef. Gas**H280****Hazard statements for physical hazards****H280****Contains gas under pressure; may explode if heated.****2.2. Label elements****Labelling according to Regulation (EC) No 1272/2008 [CLP/GHS]****GHS04****! Signal word****Warning**

Hazard statements for physical hazards**H280** Contains gas under pressure; may explode if heated.**Precautionary Statements****Storage**

P403 Store in a well-ventilated place.

Hazardous ingredients for labeling

2,3,3,3-Tetrafluoroprop-1-ene (R 1234yf), Difluoromethane (R 32), Pentafluoroethane (R 125)

Supplemental Hazard information (EU)**Health properties**

Asphyxiant in high concentrations.

Environmental properties

Contains fluorinated greenhouse gases.

Special rules for supplemental label elements for certain mixtures

Withdrawal out of the liquid phase only.

2.3. Other hazards**Adverse human health effects and symptoms**

Contact with liquid may cause cold burns/frostbite.

The inhalation of gas / vapour in high concentrations may cause cardiac arrhythmia.

Misuse or intentional inhalation abuse may cause death without warning symptoms, due to cardiac effects.

Information pertaining to special dangers for human and environment

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

Receptacle under pressure.

! Results of PBT and vPvB assessment

The substances in this mixture do not meet the PBT/vPvB criteria of REACH, annex XIII.

SECTION 3: Composition/ information on ingredients**3.1. Substances**

not applicable

3.2. Mixtures**Hazardous ingredients**

CAS No	EC No	Name	[% weight]	Classification according to Regulation (EC) No 1272/2008 [CLP/GHS]
354-33-6	206-557-8	Pentafluoroethane (R 125)	59	Liq. Gas, H280
75-10-5	200-839-4	Difluoromethane (R 32)	11	Flam.Gas1, H220 / Liq.Gas, H280
754-12-1	468-710-7	2,3,3,3-Tetrafluoroprop-1-ene (R 1234yf)	30	Flam. Gas 1, H220 / Liq. Gas, H280

REACH

CAS No	Name	REACH registration number
354-33-6	Pentafluoroethane (R 125)	01-2119485636-25
75-10-5	Difluoromethane (R 32)	01-2119471312-47
754-12-1	2,3,3,3-Tetrafluoroprop-1-ene (R 1234yf)	01-0000019665-61

Additional advice

The text of the H-phrases is shown in section 16.

Contains fluorinated greenhouse gases.

SECTION 4: First aid measures**4.1. Description of first aid measures****General information**

Remove contaminated soaked clothing immediately.

Adhere to personal protective measures when giving first aid.

Seek medical advice immediately.

In case of inhalation

Remove the casualty into fresh air and keep him immobile.

Seek medical treatment immediately.

In case of respiratory standstill give artificial respiration by respiratory bag (Ambu bag) or respirator. Send for a doctor.

! In case of skin contact

In case of contact with skin wash off with warm water.

In case of frostbite rinse with plenty of water. Don't remove clothing.

In case of frostbite spray with lukewarm (not hot) water for at least 15 minutes. Do not remove clothing frozen to the skin. Thaw it with lukewarm water. Apply a sterile dressing. Obtain medical assistance.

In case of eye contact

Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Call for a doctor immediately.

In case of ingestion

Ingestion is not considered a potential route of exposure.

4.2. Most important symptoms and effects, both acute and delayed**Physician's information / possible symptoms**

The following symptoms may occur in case of strong exposition:

Unconsciousness

Cardiac arrhythmia (disordered cardiac rhythm).

Headache

Nausea

Confusion

Dizziness

Contact with liquid may cause cold burns/frostbite.

Physician's information / possible dangers

Risk of cardiac rhythm disturbances

Long-term inhaling of separation products may cause pulmonary oedema.

4.3. Indication of any immediate medical attention and special treatment needed**Treatment (Advice to doctor)**

Treat symptoms.

Do not give any preparations of the adrenalin-ephedrine group.

SECTION 5: Firefighting measures**5.1. Extinguishing media****Suitable extinguishing media**

Product does not burn, fire-extinguishing activities according to surrounding.

ABC powder

Unsuitable extinguishing media

Full water jet

5.2. Special hazards arising from the substance or mixture

In case of fire formation of dangerous gases possible.

Formation of explosive gas mixtures in air.

Carbon monoxide (CO)

Hydrogen fluoride (HF)

Carbonyl fluoride.

5.3. Advice for firefighters

Special protective equipment for fire-fighters

Use breathing apparatus with independent air supply (isolated).

Wear full protective clothing.

Additional information

Cool endangered containers with water spray jet.

Exposure to fire may cause containers to rupture / explode.

Fire residues and contaminated firefighting water must be disposed of in accordance with the local regulations.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

For non-emergency personnel

See section 8.

Evacuate area.

Keep people away and stay on the upwind side.

For emergency responders

Remove persons to safety.

Personal protection by wearing close-fitting protective clothing and breathing apparatus.

6.2. Environmental precautions

If possible, stop flow of product.

Do not discharge into the drains/surface waters/groundwater.

Prevent spread over a wide area (e.g. by containment or oil barriers).

Suppress gases/vapours/mists with water spray jet

Do not discharge into the subsoil/soil.

6.3. Methods and material for containment and cleaning up

Ensure adequate air ventilation.

Allow to vaporise.

6.4. Reference to other sections

Safe handling: see section 7

Disposal: see section 13

Personal protection equipment: see section 8

SECTION 7: Handling and storage

7.1. Precautions for safe handling

! Advice on safe handling

Use only in thoroughly ventilated areas.

Transfer and handle only in enclosed systems.

Containers' temperature may not be increased above 50 °C.

Do not heat with open flames.

The working pressure in the receptacle must not exceed the saturation vapour pressure of the pure product resulting at a temperature of 50 °C.

Provide good room ventilation even at ground level (vapours are heavier than air).

Prevent cylinders from falling over.

Avoid release to the environment.
Ensure valve protection device is correctly fitted.
Ensure valve outlet cap nut or plug (where provided) is correctly fitted.
Open valve slowly to avoid pressure shock.
Do not allow backfeed into the container.
Suck back of water into the container must be prevented.
No water to valves, flanges and other fittings.
Purging of pipes and valves with inert gases - to avoid: water, solvents.

General protective measures

Do not inhale gases/vapours/aerosols.

Hygiene measures

At work do not eat, drink and smoke.

! Advice on protection against fire and explosion

The product is not flammable in air under ambient conditions of temperature and pressure. When pressurised with air, oxygen or other oxidants, it may become flammable.
Pay attention to general rules of internal fire prevention.

7.2. Conditions for safe storage, including any incompatibilities**! Requirements for storage rooms and vessels**

Keep in closed original container.
Ventilate store-rooms thoroughly.
Use transportable pressure equipment.
Suitable materials: Normalised carbon steel, tempered alloy steel, aluminium alloys, austenitic stainless steels.
Valve: Suitable materials: Brass, copper alloys, carbon steels, aluminium alloys, austenitic stainless steels.
Other material details see ISO 11114.
All regulations and local requirements for the storage of containers have to be respected.

! Advice on storage compatibility

Do not store with spontaneously flammable materials.
Do not store together with combustible liquids or combustible solids.
Do not store together with animal feedstuffs.
Do not store together with explosives.
Do not store together with infectious substances.
Do not store together with radioactive material.
Do not store together with toxic liquids or toxic solids.
Do not store together with food.
Do not store together with oxidizing liquids or oxidizing solids.

! Further information on storage conditions

Ensure valve protection device is correctly fitted.
Store closed container at cool and aired place.
Store only in original container at temperature of 50 °C maximum (=122 °F).
Prevent cylinders from falling over.
Protect of heat.

! Information on storage stability

At appropriate storage unlimited stability.

7.3. Specific end use(s)**! Recommendation(s) for intended use**

Use in accordance with regulation (EU) No 517/2014 on fluorinated greenhouse gases.

SECTION 8: Exposure controls/personal protection**8.1. Control parameters****DNEL-/PNEC-values****DNEL worker**

CAS No	Substance name	Value	Code	Remark
354-33-6	Pentafluoroethane (R 125)	16444 mg/m ³	DNEL long-term inhalative (systemic)	Assessment factor 7,5
75-10-5	Difluoromethane (R 32)	7035 mg/m ³	DNEL long-term inhalative (systemic)	Assessment factor 7,5, Extrapolation
754-12-1	2,3,3,3-Tetrafluoroprop-1-ene (R 1234yf)	950 mg/m ³	DNEL long-term inhalative (systemic)	repeated dose toxicity.

DNEL Consumer

CAS No	Substance name	Value	Code	Remark
354-33-6	Pentafluoroethane (R 125)	1753 mg/m ³	DNEL long-term inhalative (systemic)	Assessment factor 25
75-10-5	Difluoromethane (R 32)	750 mg/m ³	DNEL long-term inhalative (systemic)	Assessment factor 25

PNEC

CAS No	Substance name	Value	Code	Remark
354-33-6	Pentafluoroethane (R 125)	1 mg/l	PNEC aquatic, intermittent release	Assessment factor 100, Extrapolation
		0,6 mg/kg dw	PNEC sediment, freshwater	Extrapolation
		0,1 mg/l	PNEC aquatic, freshwater	Assessment factor 1000, Extrapolation
75-10-5	Difluoromethane (R 32)	0,534 mg/kg dw	PNEC sediment, freshwater	Extrapolation
		0,142 mg/l	PNEC aquatic, freshwater	Assessment factor 1000
		1,42 mg/l	PNEC aquatic, intermittent release	Assessment factor 100
754-12-1	2,3,3,3-Tetrafluoroprop-1-ene (R 1234yf)	1,35 mg/kg dw	PNEC sediment, freshwater	
		0,135 mg/kg dw	PNEC sediment, marine water	
		0,72 mg/kg	PNEC soil	
		0,33 mg/l	PNEC aquatic, intermittent release	
		0,025 mg/l	PNEC aquatic, marine water	Assessment factor 100, assessment factor.
		0,25 mg/l	PNEC aquatic, freshwater	Assessment factor 10, assessment factor.

8.2. Exposure controls**Respiratory protection**

Breathing apparatus in the event of high concentrations.

Keep self contained breathing apparatus readily available for emergency use.

Respiratory protection complying with EN 137.

In case of rescue and maintenance activities in storage containers use environment-independent breathing apparatus because of risk of suffocation by edging out of air oxygen

Hand protection

Leather gloves

Protective gloves complying with EN 374.

Protective gloves against cold complying with EN 511.

! Eye protection

Protective goggles according to EN 166, in case of increased risk add protective face shield.

! Other protection measures

Safety shoes with steel toe.

Body covering work clothing, or chemical resistant suit at increased risk complying with EN 14605.

Thermal hazards

Contact with the liquid phase may cause cold burns / frostbite.

Appropriate engineering controls

Transfer and handle only in enclosed systems.

Industrial ventilation (local ventilation).

SECTION 9: Physical and chemical properties**9.1. Information on basic physical and chemical properties****Appearance**

Gaseous / liquefied under pressure.

Colour

colourless

Odour

ethereal

Odour threshold

not determined

Important health, safety and environmental information

	Value	Temperature	at	Method	Remark
pH value	not applicable				
Acid number	not applicable				
boiling point	-47 °C		1013 hPa		
melting point	not determined				
Flash point	not applicable				
Vapourisation rate	> 1 cm/s				CCI4=1
Flammable (solid)	not applicable				

	Value	Temperature	at	Method	Remark
Flammability (gas)					The mixture does not meet the criteria for classification as a flammable gas.
Ignition temperature	not applicable				
Self ignition temperature	not applicable				
Lower explosion limit	no			ASTM E-681	
Upper explosion limit	no			ASTM E-681	
Vapour pressure	13159 hPa	25 °C			
Relative density	1,1296 g/cm ³	25 °C			information concerns to liquid phase
Bulk density	not applicable				
Vapour density	3,64		1013 hPa		air = 1
Solubility in water	198 - 1680 mg/l	25 °C	1013 hPa		Data refer to the components of the mixture.
Solubility/other	not determined				
Partition coefficient n-octanol/water (log P O/W)	not applicable				
Decomposition temperature	not determined				
Viscosity not applicable	not determined				
Oxidising properties	no				
Explosive properties	no				
9.2. Other information	Vapours are heavier than air.				

SECTION 10: Stability and reactivity**10.1. Reactivity**

See section "Possibility of hazardous reactions".

10.2. Chemical stability

Stable under recommended conditions of use and storage (see section 7).

10.3. Possibility of hazardous reactions

Reactions with oxidizing agents.

Reactions with alkalis.

When pressurised with air, oxygen or other oxidants, the mixture may become flammable.

Reactions with alkali metals.

Reactions with earth alkali metals.

Reactions with metals in powder form.

Reactions with metal salts in powder form.

10.4. Conditions to avoid

Heat sources / heat - risk of bursting.

Avoid contact with open flames, glowing metal surfaces, etc..

10.5. Incompatible materials**Substances to avoid**

Metals in powder form.

Metallic salts in powder form.

Strong oxidizing agents.

Alkali metals.

Earth alkali metals.

10.6. Hazardous decomposition products

Carbon monoxide

Fluorophosgene on contact open flame or glowing objects

Hydrogen fluoride

Carbonyl fluoride

Thermal decomposition

Remark No decomposition if used as directed.

SECTION 11: Toxicological information**11.1. Information on toxicological effects****Acute toxicity/Irritation/Sensitization**

	Value/Validation	Species	Method	Remark
LD50 acute oral	not applicable			
LD50 acute dermal	not applicable			
LC50 acute inhalation	> 20345 ppm (4 h)	rat (male / female)	OECD 403	R-1234yf
Skin irritation	low irritant effect - not necessary to label			R-1234yf

	Value/Validation	Species	Method	Remark
Eye irritation	low irritant - no labeling duty			R-1234yf
Skin sensitization	not determined			
Sensitization respiratory system	not determined			

Subacute Toxicity - Carcinogenicity

	Value	Species	Method	Validation
Subchronic Toxicity	NOAEL \geq 50000 ppm (91 d) Inhalation Information concerns to main component.	Rat (male / female)	OECD 413-6 h/d, 5 d/w	No effects of toxicological significance.
Mutagenicity	Inhalation 2,5 - 50 % (4 - 24 h) Inhalation. R-1234yf.	human lymphocytes	OECD 473	No experimental information on genotoxicity in vitro available.
Reproduction-Toxicity	NOAEL \geq 30000 ppm Inhalation. Information concerns to main component. 6 h/d, 5 d/w	Rat (male / female)	OECD 415	No indications of toxic effects were observed in reproduction studies in animals.

Carcinogenicity

No indications of carcinogenic effects are available from long-term trials.

Specific target organ toxicity (single exposure)

Substance or mixture is not classified in GHS-criteria as specific target organ toxic with single exposure.

Specific target organ toxicity (repeated exposure)

Substance or mixture is not classified in GHS-criteria as specific target organ toxic with repeated exposure.

Aspiration hazard

not applicable

Experiences made from practice

May cause frostbite.

The inhalation of gas / vapour in high concentrations may cause cardiac sensitization (dogs).

Gases have a suffocating effect.

Inhalation causes narcotic effect/intoxication.

Additional information

The product has not been tested. The information is derived from the properties of the individual components.

!SECTION 12: Ecological information**12.1. Toxicity****Ecotoxicological effects**

	Value	Species	Method	Validation
Fish	LC50 33 mg/l (96 h)	Orycias Latipes	OECD 203	R-1234yf
Daphnia	EC50 65 mg/l (48 h)	Daphnia magna	OECD 202	R-1234yf
Algae	EC50 > 2,5 mg/l (72 h)	Selenastrum capricornutum	OECD 201	R-1234yf

12.2. Persistence and degradability

	Elimination rate	Method of analysis	Method	Validation
Physico-chemical degradability	not determined			
Biological degradability	2,5 - 5 % (5 - 28 d)	GC substance decrease	OECD 301 D	not readily degradable
	Information is related to main component.			
Degradability	not determined			

12.3. Bioaccumulative potential

The product has not been tested. Because of the product's consistency and low solubility in water bioavailability is not likely.

12.4. Mobility in soil

Adsorption in the soil is not likely.

The product has not been tested. The information is derived from the properties of the individual components.

12.5. Results of PBT and vPvB assessment

The substances in this mixture do not meet the PBT/vPvB criteria of REACH, annex XIII.

12.6. Other adverse effects

ODP: 0

GWP: 2140

! General regulation

Use in accordance with regulation (EU) No 517/2014 on fluorinated greenhouse gases.

Avoid release to the environment.

!SECTION 13: Disposal considerations**13.1. Waste treatment methods****Waste code No.**

14 06 01*

Name of waste

chlorofluorocarbons, HCFC, HFC

Wastes marked with an asterisk are considered to be hazardous waste pursuant to Directive 2008/98/EC on hazardous waste.

! Recommendations for the product

Dispose of as hazardous waste.

Return to manufacturer.

Recommendations for packaging

Transportable pressure equipment (empty, residual pressure): Return to supplier / manufacturer.

General information

Operators of stationary equipment shall be responsible for putting in place arrangements for the proper recovery.

SECTION 14: Transport information

	ADR/RID	IMDG	IATA-DGR
14.1. UN number	1078	1078	1078
14.2. UN proper shipping name	REFRIGERANT GAS, N.O.S. (Pentafluoroethane, 2,3,3,3-Tetrafluoroprop-1-ene, Difluoromethan)	REFRIGERANT GAS, N.O.S. (Pentafluoroethane, 2,3,3,3-Tetrafluoroprop-1-ene, Difluoromethane)	Refrigerant gas, n.o.s. (Pentafluoroethane, 2,3,3,3-Tetrafluoroprop-1-ene, Difluoromethane)
14.3. Transport hazard class(es)	2.2	2.2	2.2
14.4. Packing group	-	-	-
14.5. Environmental hazards	No	No	No

14.6. Special precautions for user

The protective measures listed in Sections 6, 7 and 8 of the Safety Data Sheet have to be considered.

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

not applicable

No transport as bulk according IBC - Code.

Land and inland navigation transport ADR/RID

Hazard label(s) 2.2

tunnel restriction code C/E

Classification code 2A

SECTION 15: Regulatory information**15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture****! Other regulations (EU)**

Regulation (EU) No 517/2014 on fluorinated greenhouse gases.

Regulation (EU) 2015/2068 establishing, pursuant to Regulation (EU) No 517/2014, the format of labels for products and equipment containing fluorinated greenhouse gases.

Regulation (EU) 2015/2067 establishing, pursuant to Regulation (EU) No 517/2014, ~ certification ~ as regards stationary refrigeration, air conditioning and heat pump equipment, and ~ containing fluorinated greenhouse gases.

VOC standard

VOC content >=99 % 25 °C 13760 hPa

Remark

Information concerns to main component.

15.2. Chemical Safety Assessment

No chemical safety assessment has been carried out for this mixture.

The protective measures listed in Sections 6, 7 and 8 of the Safety Data Sheet have to be considered.

An exposure scenario is not required.

Chemical safety assessments for substances in this mixture were carried out.

!SECTION 16: Other information

! Recommended uses and restrictions

Use in accordance with regulation (EU) No 517/2014 on fluorinated greenhouse gases.
National and local regulations concerning chemicals shall be observed.

Further information

The information contained herein is based on the state of our knowledge. It characterizes the product with regard to the appropriate safety precautions. It does not represent a guarantee of the properties of the product.

Indication of changes: "!" = Data changed compared with the previous version. Previous version: 1.0

! Sources of key data used

For the preparation of this safety data sheet, information from our suppliers as well as data from the "database of registered substances" of the European Chemicals Agency (ECHA) were used.

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