

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

### 1.1. Product identifier

Name of product	R 1234yf Art-Nr(n): 0070
Name of substance	2,3,3,3-Tetrafluoroprop-1-ene (R 1234yf)
EC No	468-710-7
REACH registration number	01-0000019665-61
CAS No	754-12-1

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

#### Identified uses

#### ! Sector of uses [SU]

SU10 - Formulation [mixing] of preparations and/or re-packaging (excluding alloys)

SU17 - General manufacturing, e.g. machinery, equipment, vehicles, other transport equipment

SU3 - Industrial uses: Uses of substances as such or in preparations at industrial sites

#### ! Product categories [PC]

PC16 - Heat transfer fluids

#### ! Process categories [PROC]

PROC9 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

#### ! Environmental release categories [ERC]

ERC7 - Industrial use of substances in closed systems

#### Recommended intended purpose(s)

Refrigerant.

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

S. Zukauskio 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  
Siltnamiu 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
--------------------------------------	-------------------	--------------------------

Flam. Gas 1	H220	
Liquef. Gas	H280	

**! Hazard statements for physical hazards**

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

**2.2. Label elements****Labelling according to Regulation (EC) No 1272/2008 [CLP/GHS]**

GHS02

**! Signal word**

Danger

**! Hazard statements for physical hazards**

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

**Precautionary Statements****! Prevention**

P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
------	--

**! Response**

P377	Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381	Eliminate all ignition sources if safe to do so.

**! Storage**

P403	Store in a well-ventilated place.
------	-----------------------------------

**Hazardous ingredients for labeling**

2,3,3,3-Tetrafluoroprop-1-ene (R 1234yf)

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

Contact with liquid may cause cold burns/frostbite.  
Asphyxiant in high concentrations.

**Information pertaining to special dangers for human and environment**

In use, may form flammable/explosive vapour-air mixture.  
Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

**Results of PBT and vPvB assessment**

This substance does not meet the PBT/vPvB criteria of REACH, annex XIII.

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

CAS No 754-12-1

2,3,3,3-Tetrafluoroprop-1-ene (R 1234yf)

EC No 468-710-7

REACH registration number 01-0000019665-61

**3.2. Mixtures**

not applicable

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

Remove contaminated soaked clothing immediately.

In the event of persistent symptoms receive medical treatment.

Adhere to personal protective measures when giving first aid.

**In case of inhalation**

Remove the casualty into fresh air and keep him immobile.

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. 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**

Delirious state

Headache

Confusion

**Physician's information / possible dangers**

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)**

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

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

Dry powder

Carbon dioxide

Water spray jet

**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.

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.

## SECTION 6: Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures

#### For non-emergency personnel

See chapter 8.

Evacuate area.

Keep away sources of ignition.

#### For emergency responders

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

Keep people away and stay on the upwind side.

Eliminate all ignition sources if safe to do so.

Keep away sources of ignition.

### 6.2. Environmental precautions

If possible, stop flow of product.

Eliminate ignition sources.

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**

Keep away from sources of ignition  
Take precautionary measures against static discharges (earthing (grounding) at pouring)  
Do not use sparking tools.  
Use only explosion-proof equipment.

#### **7.2. Conditions for safe storage, including any incompatibilities**

##### **! Requirements for storage rooms and vessels**

Keep in closed original container.  
Ventilate store-rooms thoroughly.  
Suitable materials: Normalised steel and carbon steel, tempered steel, aluminium alloys, stainless steel.  
Valve: Suitable materials: Brass, copper alloys, carbon steels, aluminium alloys, stainless steel.

##### **! 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 agents.

##### **! Further information on storage conditions**

Keep container tightly closed.  
Store only in original container at temperature of 50°C maximum (=122°F).  
Prevent cylinders from falling over.  
Keep container in a well-ventilated place  
Protect of heat.

#### **7.3. Specific end use(s)**

##### **! Recommendation(s) for intended use**

See section 1.2  
Exposure scenarios (ES) see annex to this safety data sheet.  
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
754-12-1	2,3,3,3-Tetrafluoroprop-1-ene (R 1234yf)	950 mg/m <sup>3</sup>	DNEL long-term inhalative (systemic)	

**PNEC**

CAS No	Substance name	Value	Code	Remark
754-12-1	2,3,3,3-Tetrafluoroprop-1-ene (R 1234yf)	1,54 mg/kg dw	PNEC soil	
		0,178 mg/kg dw	PNEC sediment, marine water	
		1,77 mg/kg dw	PNEC sediment, freshwater	
		1 mg/l	PNEC aquatic, intermittent release	
		0,01 mg/l	PNEC aquatic, marine water	
		0,1 mg/l	PNEC aquatic, freshwater	

**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.

**Eye protection**

Safety goggles, in case of increased risk add protective face shield

Safety goggles with side protection complying with EN 166.

**Other protection measures**

Safety shoes with steel toe.

Body covering work clothing, or chemical resistant suit at increased risk.

**! Limitation and surveillance of the environment**

See chapter 7. No additional measures necessary.

**Appropriate engineering controls**

Transfer and handle only in enclosed systems.

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

Gaseous / liquefied under pressure.

**Colour**

colourless

**Odour**

mildly ethereal

**Odour threshold**

not determined

**Important health, safety and environmental information**

	Value	Temperature	at	Method	Remark
<b>pH value</b>	not applicable				
<b>boiling point</b>	-29,4 °C		1013 hPa		
<b>melting point</b>	Not known.				
<b>Flash point</b>	not applicable				
<b>Vapourisation rate</b>	not determined				
<b>Flammable (solid)</b>	not determined				
<b>Flammability (gas)</b>					flammable.
<b>Ignition temperature</b>	not determined				
<b>Self ignition temperature</b>	405 °C				
<b>Lower explosion limit</b>	6,2 Vol-%				
<b>Upper explosion limit</b>	12,3 Vol-%				
<b>Vapour pressure</b>	6067 hPa	21,1 °C			
<b>Relative density</b>	1,1 g/cm <sup>3</sup>	25 °C			liquid phase
<b>Vapour density</b>	3,9			Calculated	Heavier than air.
<b>Solubility in water</b>	198,2 mg/l	24 °C		92/69/EEC, A.8	
<b>Solubility/other</b>	not determined				
<b>Partition coefficient n-octanol/water (log P O/W)</b>	2,15			92/69/EEC, A.8	
<b>Decomposition temperature</b>	not determined				
<b>Viscosity</b>	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 normal conditions.

**10.3. Possibility of hazardous reactions**

May react violently with oxidants.

**10.4. Conditions to avoid**

Heat sources / heat - risk of bursting.

Sources of ignition.

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

**10.5. Incompatible materials**

**Substances to avoid**

Light metal

magnesium.

Zinc.

Strong oxidizing agents.

Alkali metals.

**10.6. Hazardous decomposition products**

Carbon monoxide

Fluorophosgene on contact open flame or glowing objects

Hydrogen 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
<b>LD50 acute oral</b>				not applicable
<b>LD50 acute dermal</b>				not applicable



	Value/Validation	Species	Method	Remark
<b>LC50 acute inhalation</b>	> 400000 ppm (4 h)	rat		
<b>Skin irritation</b>	low irritant effect -not necessary to label			
<b>Eye irritation</b>	low irritant - no labeling duty			
<b>Skin sensitization</b>				not determined
<b>Sensitization respiratory system</b>				not determined

### Subacute Toxicity - Carcinogenicity

	Value	Species	Method	Validation
<b>Subchronic Toxicity</b>	NOAEL 233 mg/kg (672 h) Inhalation	Rat		No effects of toxicological significance.
<b>Mutagenicity</b>				No experimental information on genotoxicity in vitro and in vivo available.
<b>Reproduction-Toxicity</b>				No indications of toxic effects were observed in reproduction studies in animals.
<b>Carcinogenicity</b>				No indications of carcinogenic effects are available from long-term trials.

### Experiences made from practice

Gases have a suffocating effect.

## SECTION 12: Ecological information

### 12.1. Toxicity

#### Ecotoxicological effects

	Value	Species	Method	Validation
<b>Fish</b>	LC50 197 mg/l (96 h)	Cyprinus carpio	OECD 203	No noticeable toxic effect in saturated solution.
<b>Daphnia</b>	EC50 > 83 mg/l (48 h)	Daphnia magna	OECD 202	
<b>Algae</b>	EC50 > 100 mg/l	Selenastrum capricornutum		

### 12.2. Persistence and degradability

	Elimination rate	Method of analysis	Method	Validation
<b>Biological degradability</b>	< 5 % (28 d)		OECD 301 F	not readily degradable

**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**

not determined

**12.5. Results of PBT and vPvB assessment**

This substance does not meet the PBT/vPvB criteria of REACH, annex XIII.

**12.6. Other adverse effects**

ODP: 0

GWP: 4

**General regulation**

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.

**SECTION 14: Transport information**

	ADR/RID	IMDG	IATA-DGR
<b>14.1. UN number</b>	3161	3161	3161
<b>14.2. UN proper shipping name</b>	LIQUEFIED GAS, FLAMMABLE, N.O.S. (2,3,3,3-Tetrafluoroprop-1-ene (R 1234yf))	LIQUEFIED GAS, FLAMMABLE, N.O.S. (2,3,3,3-Tetrafluoroprop-1-ene)	Liquefied gas, flammable, n.o.s. (2,3,3,3-Tetrafluoroprop-1-ene)
<b>14.3. Transport hazard class(es)</b>	2.1	2.1	2.1
<b>14.4. Packing group</b>	-	-	-
<b>14.5. Environmental hazards</b>	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

No transport as bulk according IBC - Code.

#### Land and inland navigation transport ADR/RID

Hazard label(s) 2.1  
tunnel restriction code B/D  
Classification code 2F

#### Marine transport IMDG

Ems: F-D, S-U

### ! SECTION 15: Regulatory information

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

##### ! Other regulations (EU)

Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), Annex XVII No 40.  
Directive 2012/18/EU on the control of major-accident hazards involving dangerous substances.

#### VOC standard

**VOC content** >=99 % 21,1 °C 6067 hPa

#### 15.2. Chemical Safety Assessment

For this substance a chemical safety assessment has been carried out.  
Exposure scenarios (ES) see annex to this safety data sheet.

### ! 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

All declarations of safety-data-sheet refer to pure substance.

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: 2.1