

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

1.1. Product identifier

Name of product

R 437A (Isceon MO49 Plus)

Art-Nr(n): 0020

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, Ramuciai, 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

Siltnamiy 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

1,1,1,2-Tetrafluoroethane (R 134a), butane, Pentafluoroethane (R 125), pentane

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]
811-97-2	212-377-0	1,1,1,2-Tetrafluoroethane (R 134a)	77,8 - 80,0	Liq. Gas, H280
354-33-6	206-557-8	Pentafluoroethane (R 125)	17,7 - 20,0	Liq. Gas, H280
106-97-8	203-448-7	n-Butan	1,2 - 1,5	Flam. Gas 1, H220 / Liq. Gas, H280
109-66-0	203-692-4	pentane	0,4 - 0,7	Flam. Liq. 2, H225 / Asp. Tox. 1, H304 / STOT SE 3, H336 / Aquatic Chronic 2, H411

REACH

CAS No	Name	REACH registration number
811-97-2	1,1,1,2-Tetrafluoroethane (R 134a)	01-2119459374-33
354-33-6	Pentafluoroethane (R 125)	01-2119485636-25
106-97-8	n-Butan	01-2119474691-32

REACH (continued)

CAS No	Name	REACH registration number
109-66-0	pentane	01-2119459286-30

! Additional advice

The text of the H-and EUH-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

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.

Alcohol-resistant foam

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.

Formation of explosive gas mixtures in air.

Carbon monoxide (CO)

Carbon dioxide (CO₂)

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

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.

Pay attention to extension of gas especially at ground (heavier than air) and in direction of the wind.

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).

Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.

If necessary, secure leaky pressure receptacles in a salvage packaging.

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.

! Hygiene measures

At work do not eat, drink and smoke.

Wash hands before breaks and after work.

! 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.

Only use containers that are approved specifically for the substance/product.

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 together with combustible materials.

Do not store together with spontaneously flammable materials.

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

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****! Ingredients with occupational exposure limits to be monitored**

CAS No	Name	Code	[mg/m3]	[ppm]	Remark
106-97-8	Butane	WEL, 8 hours Short-term	1450 1810	600 750	EH40, United Kingdom
811-97-2	1,1,1,2-Tetrafluoroethane (HFC 134a)	WEL, 8 hours	4240	1000	EH40, United Kingdom
109-66-0	Pentane	WEL, 8 hours	1800	600	EH40, United Kingdom

DNEL-/PNEC-values**DNEL worker**

CAS No	Substance name	Value	Code	Remark
109-66-0	pentane	432 mg/ kg bw/day	DNEL long-term dermal (systemic)	Assessment factor 3, repeated dose toxicity.
		3000 mg/ m3	DNEL long-term inhalative (systemic)	Assessment factor 3, repeated dose toxicity.
354-33-6	Pentafluoroethane (R 125)	16444 mg/m3	DNEL long-term inhalative (systemic)	Assessment factor 7,5, repeated dose toxicity.
811-97-2	1,1,1,2-Tetrafluoroethane (R 134a)	13936 mg/m3	DNEL long-term inhalative (systemic)	Assessment factor 7,5, repeated dose toxicity.

DNEL Consumer

CAS No	Substance name	Value	Code	Remark
109-66-0	pentane	214 mg/ kg bw/day	DNEL long-term oral (repeated)	Assessment factor 5, repeated dose toxicity.
		214 mg/ kg bw/day	DNEL long-term dermal (systemic)	Assessment factor 5, repeated dose toxicity.
		643 mg/m3	DNEL long-term inhalative (systemic)	Assessment factor 5, repeated dose toxicity.
354-33-6	Pentafluoroethane (R 125)	1753 mg/ m3	DNEL long-term inhalative (systemic)	Assessment factor 25, repeated dose toxicity.
811-97-2	1,1,1,2-Tetrafluoroethane (R 134a)	2476 mg/ m3	DNEL long-term inhalative (systemic)	Assessment factor 15, repeated dose toxicity.

PNEC

CAS No	Substance name	Value	Code	Remark
109-66-0	pentane	880 µg/l	PNEC aquatic, intermittent release	Assessment factor 1
		230 µg/l	PNEC aquatic, marine water	Assessment factor 1
		3600 µg/l	PNEC sewage treatment plant (STP)	Assessment factor 1
		1,2 mg/kg dw	PNEC sediment, freshwater	Assessment factor 1
		1,2 mg/kg dw	PNEC sediment, marine water	Assessment factor 1
		230 µg/l	PNEC aquatic, freshwater	Assessment factor 1
		0,55 mg/kg dw	PNEC soil	Assessment factor 1
354-33-6	Pentafluoroethane (R 125)	1 mg/l	PNEC aquatic, intermittent release	Assessment factor 100, assessment factor.
		0,6 mg/kg dw	PNEC sediment, freshwater	
		0,1 mg/l	PNEC aquatic, freshwater	Assessment factor 1000, assessment factor.
811-97-2	1,1,1,2-Tetrafluoroethane (R 134a)	0,1 mg/l	PNEC aquatic, freshwater	Assessment factor 1000, assessment factor.
		1 mg/l	PNEC aquatic, intermittent release	Assessment factor 100, assessment factor.
		0,01 mg/l	PNEC aquatic, marine water	Assessment factor 10000
		0,75 mg/kg dw	PNEC sediment, freshwater	Extrapolation
		73 mg/l	PNEC sewage treatment plant (STP)	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.

Do not use any filter apparatus.

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

Safety gloves according EN 388

! 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.

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

ethereal

Odour threshold

not determined

Important health, safety and environmental information

	Value	Temperature	at	Method	Remark
pH value	not applicable				
boiling point	-32 °C		1013 hPa		
melting point	not determined				
Flash point	not applicable				
Vapourisation rate	not determined				
Flammable (solid)	not applicable				
Flammability (gas)	no				
Ignition temperature	not determined				
Self ignition temperature	not determined				
Lower explosion limit	no			ASTM E-681	
Upper explosion limit	no			ASTM E-681	
Vapour pressure	7949 hPa	25 °C			
Relative density	37,22 g/m ³	25 °C			
Vapour density	3,7				Air = 1.

	Value	Temperature	at	Method	Remark
Solubility in water	not determined				
Solubility/other	not determined				
Partition coefficient n-octanol/water (log P O/W)	not determined				
Decomposition temperature	not determined				
Viscosity	not applicable				

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

May react violently with oxidants.

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.

Reactions with alkalies.

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.

Alkalies.

Alkali metals.

Earth alkali metals.

10.6. Hazardous decomposition products

Carbon monoxide and carbon dioxide.

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	Study technically not feasible.			
LD50 acute dermal	Study technically not feasible.			
LC50 acute inhalation	> 567000 ppm (4 h)	rat	OECD 403	R-134a
Skin irritation	non-irritant	Guinea pig		R-134a
Eye irritation	non-irritant	rabbit eye		R-134a
Skin sensitization	non-sensitizing	Guinea pig		
Sensitization respiratory system	non-sensitizing			

Subacute Toxicity - Carcinogenicity

	Value	Species	Method	Validation
Subchronic Toxicity	NOAEL 50000 ppm (2 a) Inhalation 6 h/d, 5 d/w	Rat (male / female)	OECD 453	R-134a

Mutagenicity

No experimental information on genotoxicity in vivo available.

Reproduction-Toxicity

No indications of toxic effects were observed in reproduction studies in animals.

Value	Species	Method	Validation
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.

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 450 mg/l (96 h)	Oncorhynchus mykiss	EU Method C.1	R-134a
Daphnia EC50 980 mg/l (48 h)	Daphnia magna	EU Method C.2	R-134a
Algae EC50 > 118 mg/l (72 h)	Algae	EU Method C.3	The product has not been tested. The information was derived from products of similar structure or composition.
Bacteria EC10 > 730 mg/l (6 h)	Pseudomonas putida		R-134a

12.2. Persistence and degradability

Elimination rate	Method of analysis	Method	Validation
Biological degradability 3 % (28 d)		OECD 301 D	Not readily degradable (R-134a).

12.3. Bioaccumulative potential

No high bioaccumulation potential.

12.4. Mobility in soil

Because of its high volatility, it is unlikely that the product soil, water caused.

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: 1805

! General regulation

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

The product has not been tested. The data are derived from the individual components of the mixture.

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. (1,1,1,2-Tetrafluorethan (R 134a), Pentafluorethan (R 125), n-Butan, n-Pentan)	REFRIGERANT GAS, N.O.S. (1,1,1,2-Tetrafluorethan (R 134a), Pentafluorethan (R 125), n-Butane, n-Pentane)	Refrigerant gas, n.o.s. (1, 1,1,2-Tetrafluorethan (R 134a), Pentafluorethan (R 125), n-Butane, n- Pentane)
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

Special provisions 274, 582, 662

Classification code 2A

Marine transport IMDG

EmS: F-C, S-V

! 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 7949 hPa

15.2. Chemical Safety Assessment

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: 3.1

! 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.
H225	Highly flammable liquid and vapour.
H280	Contains gas under pressure; may explode if heated.
H304	May be fatal if swallowed and enters airways.
H336	May cause drowsiness or dizziness.
H411	Toxic to aquatic life with long lasting effects.