

Trade name: R-452B

Current version: 4.0.0, Revision: 21.05.2026

Replaced version: 3.0.0, Revision: 31.07.2025

Region:
GER

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

1.1 Product identifier

Trade name

R-452B

UFI:

CDM2-500U-7004-5UF4

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

Relevant identified uses of the substance or mixture

Industrial Use

Professional use

Refrigerant

Uses advised against

Consumer use

1.3 Details of the supplier of the safety data sheet

Address

TEGA-Technische Gase und Gasetechnik GmbH

Werner-von-Siemens-Straße 18

97076 Würzburg

Telephone no. +49 931 2093-220

Fax no. +49 931 2093-180

e-mail kaeltemittel@tega.de

Advice on Safety Data Sheet

sdb_info@umco.de

1.4 Emergency telephone number

For medical advice (in German and English):

+49 (0)551 192 40 (Giftinformationszentrum Nord)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification in accordance with Regulation (EC) No 1272/2008 (CLP)

Flam. Gas 1B; H221

Press. Gas liq.; H280

Classification information

This product is assessed and classified using the methods and criteria below referred to in Article 9 of Regulation (EC) n° 1272/2008:

Physical hazards: determined through assessment data based on the methods or standards referred to in part 2 of Annex I to CLP

Health hazards and environmental hazards: determined through toxicological and ecotoxicological assessment data based on the methods or standards referred to in Part 3, 4 and 5 of Annex I to CLP.

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008 (CLP Regulation)

Hazard pictograms



GHS02



GHS04

Signal word

Danger

Trade name: R-452B

Current version: 4.0.0, Revision: 21.05.2026

Replaced version: 3.0.0, Revision: 31.07.2025

Region:
GER**Hazard statement(s)**

H221 Flammable gas.
H280 Contains gas under pressure; may explode if heated.

Precautionary statement(s)

P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P377 Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381 In case of leakage, eliminate all ignition sources.
P410+P403 Protect from sunlight. Store in a well-ventilated place.

UFI:

CDM2-500U-7004-5UF4

Supplemental label elements

Contains fluorinated greenhouse gases.

2.3 Other hazards

This product does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher. Danger of suffocation by displacement of air / oxygen. Contact with the liquid can cause cold burns or frostbite. Abuse or intentional inhalation can be fatal as a result of effects on the heart without alarming symptoms.

PBT assessment

The product is not considered to be a PBT.

vPvB assessment

The product is not considered to be a vPvB.

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

Not applicable. The product is not a substance.

3.2 Mixtures**Chemical characterization**

Fluorinated hydrocarbons

Hazardous ingredients

No	Substance name	Additional information	
	CAS / EC / Index / REACH no	Classification (EC) 1272/2008 (CLP)	Concentration %
1	difluoromethane		
	75-10-5 200-839-4 - 01-2119471312-47	Flam. Gas 1B; H221 Press. Gas liq.; H280	67,00 Vol%
2	2,3,3,3-tetrafluoroprop-1-ene		
	754-12-1 468-710-7 - 01-0000019665-61	Flam. Gas 1B; H221 Press. Gas liq.; H280	26,00 Vol%
3	pentafluoroethane		
	354-33-6 206-557-8 - 01-2119485636-25	Press. Gas liq.; H280	7,00 Vol%

Full text of H- and EUH-phrases, if not already mentioned in section 2.2: see section 16.

No	Note	Specific concentration limits	M-factor (acute)	M-factor (chronic)
2	-	Flam. Gas 1B; H221: C >= 6,2%	-	-

SECTION 4: First aid measures

4.1 Description of first aid measures

General information

Adhere to personal protective measures when giving first aid. Remove affected person from danger area, lay him down. Remove soiled or soaked clothing immediately.

After inhalation

Remove affected persons from dangerous area by observing suitable respiratory protection measures. Ensure supply of fresh air. Irregular breathing/no breathing: artificial respiration. Call a doctor immediately.

After skin contact

In case of contact with skin wash off immediately with soap and water. Rinse with much water in case of frostbites. Remove clothes only after unfreezing. Cover wounds with sterile dressing. Call a doctor immediately.

After eye contact

Remove contact lenses. Rinse eye thoroughly under running water keeping eyelids wide open and protecting the unaffected eye (at least 10 to 15 minutes). Seek medical assistance.

After ingestion

Rinse the mouth thoroughly with water. Do not induce vomiting. Never give anything by mouth to an unconscious person. Call a doctor. Unlikely route of exposure.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms

The following symptoms may occur: cardiac arrhythmia; anesthetic effect; Light-headedness; Dizziness; confusion; Unconsciousness; muscle incoordination; respiratory arrest. Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling.

4.3 Indication of any immediate medical attention and special treatment needed

Treat symptomatically and supportively.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media

Alcohol resistant foam, CO₂, powders, water spray

Unsuitable extinguishing media

High power water jet

5.2 Special hazards arising from the substance or mixture

In the event of fire, the following can be released: Carbon monoxide and carbon dioxide; Hydrogen fluoride (HF); Carbonyl fluoride; fluorine compounds; Exposure to heat may cause bursting of the vessels. Vapours can form a highly flammable mixture with air.

5.3 Advice for firefighters

Use self-contained breathing apparatus. Wear full protective suit. Containers close to fire should be transferred to a safe place. Cool closed containers exposed to fire with water. Pressure increase, bursting and explosion hazard during heating. 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

Refer to protective measures listed in sections 7 and 8. Provide good room ventilation even at ground level (vapours are heavier than air). Do not breathe gas. Keep away from ignition sources. Use personal protective clothing. Cordon and mark contaminated area. Remove persons to safety. Avoid skin contact with leaking liquid (danger of frostbite!).

For emergency responders

No data available. Personal protective equipment (PPE) - see Section 8.

Trade name: R-452B

Current version: 4.0.0, Revision: 21.05.2026

Replaced version: 3.0.0, Revision: 31.07.2025

Region:
GER**6.2 Environmental precautions**

Avoid release in the environment. Suppress gases/vapours/mists with water spray jet.

6.3 Methods and material for containment and cleaning up

Ensure adequate ventilation. Dispose of absorbed material in accordance with the regulations.

6.4 Reference to other sections

Information regarding safe handling, see section 7. Information regarding personal protective measures, see section 8. Information regarding waste disposal, see section 13.

SECTION 7: Handling and storage**7.1 Precautions for safe handling****Advice on safe handling**

Only qualified and trained persons are authorised to handle. Provide good ventilation at the work area (local exhaust ventilation, if necessary). To be used only according to instructions for use. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose containers heat or sources of ignition. In case of accidental release: danger due to low temperature of the liquid product. The product should only be used in areas from which all naked lights and other sources of ignition have been excluded. Prevent the creation of flammable or explosive concentrations of vapour in air and avoid vapour concentration higher than the occupational exposure limits. Pressurized container: protect from sunlight and do not expose to temperatures exceeding 50 °C. Do not pierce or burn, even after use. Comply with the health and safety at work laws. Use explosion-proof apparatus and fittings.

General protective and hygiene measures

Wash hands before breaks and after work. Do not inhale gases. Do not eat, drink or smoke during work time. Keep away from foodstuffs and beverages. Have emergency shower available. Provide eye wash fountain in work area.

Advice on protection against fire and explosion

Isolate from sources of heat, sparks and open flame. Take precautionary measures against electrostatic loading (earthing necessary during loading operations). Electrical equipment should be protected to the appropriate standard. Vapours can form an explosive mixture with air.

7.2 Conditions for safe storage, including any incompatibilities**Technical measures and storage conditions**

Keep container tightly closed in a cool, well-ventilated place, open and handle carefully. Protect from heat and direct sunlight.

Recommended storage temperature

Value	<	50	°C
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Storage stability

Value	>	10	a
Comments	When stored properly, the storage life is unlimited.		

Requirements for storage rooms and vessels

Containers which are opened must be carefully closed and kept upright to prevent leakage. Always keep in containers of same material as the original.

Incompatible products

Substances to be avoided, see section 10.

Storage Class according TRGS 510

2A	Gases (except aerosol dispensers and lighters)
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7.3 Specific end use(s)

No data available.

SECTION 8: Exposure controls/personal protection**8.1 Control parameters****Occupational exposure limit values**

No	Substance name	CAS no.	EC no.
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Trade name: R-452B

Current version: 4.0.0, Revision: 21.05.2026

Replaced version: 3.0.0, Revision: 31.07.2025

Region:
GER

1	2,3,3,3-tetrafluoroprop-1-ene	754-12-1	468-710-7
	TRGS 900		
	2,3,3,3-Tetrafluorpropen		
	WEL long-term (8-hr TWA reference period)	950	mg/m ³ 200 ml/m ³
	Ceiling Limit	2 (II)	
	Notes	Y	

Biological limit values

No	Substance name	
1	pentafluoroethane	
	TRGS 903	
	Fluorwasserstoff und anorganische Fluorverbindungen (Fluoride)	
	parameter	Fluorid
	Value	7,0 mg/g Kreatinin
	sample material	U
	Sampling moment	b
	TRGS 903	
	Fluorwasserstoff und anorganische Fluorverbindungen (Fluoride)	
	parameter	Fluorid
	Value	4,0 mg/g Kreatinin
	sample material	U
	Sampling moment	d

DNEL, DMEL and PNEC values**DNEL values (worker)**

No	Substance name	CAS / EC no
	Route of exposure	Value
1	difluoromethane	75-10-5 200-839-4
	inhalative	Long term (chronic) systemic 7035 mg/m ³
2	2,3,3,3-tetrafluoroprop-1-ene	754-12-1 468-710-7
	inhalative	Long term (chronic) systemic 950 mg/m ³
	inhalative	Short term (acut) systemic 186400 mg/m ³
3	pentafluoroethane	354-33-6 206-557-8
	inhalative	Long term (chronic) systemic 16444 mg/m ³

DNEL value (consumer)

No	Substance name	CAS / EC no
	Route of exposure	Value
1	difluoromethane	75-10-5 200-839-4
	inhalative	Long term (chronic) systemic 750 mg/m ³
2	2,3,3,3-tetrafluoroprop-1-ene	754-12-1 468-710-7
	inhalative	Long term (chronic) systemic 113,1 mg/m ³
	inhalative	Short term (acut) systemic 186400 mg/m ³
3	pentafluoroethane	354-33-6 206-557-8
	inhalative	Long term (chronic) systemic 1753 mg/m ³

PNEC values

No	Substance name	CAS / EC no
	ecological compartment	Value
1	difluoromethane	75-10-5 200-839-4
	water	fresh water 0,313 mg/L

	water	fresh water sediment	1,807	mg/kg dry weight
2	2,3,3,3-tetrafluoroprop-1-ene		754-12-1 468-710-7	
	water	fresh water	0,1	mg/L
	water	marine water	0,01	mg/L
	water	fresh water sediment	1,51	mg/kg dry weight
	water	marine water sediment	0,151	mg/kg dry weight
	soil	-	1,49	mg/kg dry weight
3	pentafluoroethane		354-33-6 206-557-8	
	water	fresh water	0,1	mg/L
	water	fresh water sediment	0,6	mg/kg dry weight

8.2 Exposure controls

Appropriate engineering controls

Ensure adequate ventilation, local exhaust at the work station if necessary. Explosion-proof general and local exhaust ventilation.

Personal protective equipment

Respiratory protection

Self-contained breathing apparatus. In case of insufficient ventilation or long-term effect use breathing apparatus. Danger of suffocation due to high concentrations in breathing air.

Eye / face protection

Tightly fitting safety glasses (EN 166).

Hand protection

Low-temperature-resistant gloves (EN 511). Sufficient protection is given wearing suitable protective gloves checked according to i.e. EN 374, in the event of risk of skin contact with the product. Before use, the protective gloves should be tested in any case for its specific work-station suitability (i.e. mechanical resistance, product compatibility and antistatic properties). Adhere to the manufacturer's instructions and information relating to the use, storage, care and replacement of protective gloves. Protective gloves shall be replaced immediately when physically damaged or worn. Design operations thus to avoid permanent use of protective gloves.

Other

Fire-resistant antistatic protective clothing. Protective shoes.

Environmental exposure controls

Avoid release into sewage and environment.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

State of aggregation

gas

Form

liquified gas

Colour

colourless, clear

Odour

slight; to ether

pH value

reason for missing pH

substance/mixture is a gas

Trade name: R-452B

Current version: 4.0.0, Revision: 21.05.2026

Replaced version: 3.0.0, Revision: 31.07.2025

Region:
GER

Boiling point / boiling range			
Value	-51	°C	
Source	supplier		
Melting point/freezing point			
No data available			
Decomposition temperature			
No data available			
Flash point			
Not applicable			
Source	supplier		
Ignition temperature			
Value	509	°C	
Source	supplier		
Oxidising properties			
not classified			
Source	supplier		
Explosive properties			
not explosive			
Source	supplier		
Flammability			
flammable			
Source	supplier		
Lower explosion limit			
Value	12	% vol	
Method	ASTM E 681		
Source	supplier		
Upper explosion limit			
Value	23,3	% vol	
Method	ASTM E 681		
Source	supplier		
Vapour pressure			
Value	15987	hPa	
Reference temperature	25	°C	
Source	supplier		
Relative vapour density			
No data available			
Evaporation rate			
Value	>	1	
Source	supplier		
Comments	CCl4 = 1		
Relative density			
Value	0,99		
Reference temperature	25	°C	
Source	supplier		
Density			
Value	0,99	g/cm³	
Reference temperature	25	°C	
Source	supplier		
Solubility			

Trade name: R-452B

Current version: 4.0.0, Revision: 21.05.2026

Replaced version: 3.0.0, Revision: 31.07.2025

Region:
GER

No data available

Partition coefficient n-octanol/water (log value)

No	Substance name	CAS no.	EC no.
1	difluoromethane	75-10-5	200-839-4
log Pow		0,21	
Reference temperature		25	°C
with reference to		pH 6,1	
Method		OECD 107	
Source		ECHA	
2	2,3,3,3-tetrafluoroprop-1-ene	754-12-1	468-710-7
log Pow		appr. 2	
Reference temperature		25	°C
with reference to		pH 7	
Method		OECD 117	
Source		ECHA	
3	pentafluoroethane	354-33-6	206-557-8
log Pow		1,48	
Reference temperature		25	°C
with reference to		pH 6.34	
Method		OECD 107	
Source		ECHA	

Kinematic viscosity

Not applicable

Source supplier

Particle characteristics

Not applicable

Source supplier

9.2 Other information**Other information**

Hot surface ignition temperature (HSIT): > 850 °C (ASTM D 8211)

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

This material is considered to be non-reactive under normal use conditions.

10.2 Chemical stability

The product is chemically stable under recommended conditions of storage, use and temperature.

10.3 Possibility of hazardous reactions

Reacts with strong oxidizing agents. Vapours can form a highly flammable mixture with air. Flammable gas.

10.4 Conditions to avoid

Heat, naked flames and other ignition sources. Temperatures > 50°C. Contact with incompatible substances.

10.5 Incompatible materials

Avoid contamination (e.g. rust, dust, ash), risk of decomposition! Oxidizing agents; Acids; Bases; oxygen; Peroxides; Metal as powder

10.6 Hazardous decomposition products

None if stored, handled and transported properly. In case of fire: see section 5.

SECTION 11: Toxicological information**11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008****Acute oral toxicity**

Trade name: R-452B

Current version: 4.0.0, Revision: 21.05.2026

Replaced version: 3.0.0, Revision: 31.07.2025

Region:
GER

No data available

Acute dermal toxicity

No data available

Acute inhalational toxicity

No	Substance name	CAS no.	EC no.
1	difluoromethane	75-10-5	200-839-4
LC50	>	520000	ppmV
Duration of exposure		4	h
State of aggregation	Gas		
Species	rat		
Method	OECD 403		
Source	ECHA		
Evaluation/classification	Based on available data, the classification criteria are not met.		
2	2,3,3,3-tetrafluoroprop-1-ene	754-12-1	468-710-7
LC50	>	405000	ppmV
Duration of exposure		4	h
State of aggregation	Gas		
Species	rat		
Method	OECD 403		
Source	ECHA		
Evaluation/classification	Based on available data, the classification criteria are not met.		
3	pentafluoroethane	354-33-6	206-557-8
LC50	>	800000	ppmV
Duration of exposure		4	h
State of aggregation	Gas		
Species	rat		
Method	OECD 403		
Source	ECHA		

Skin corrosion/irritation

No data available

Serious eye damage/irritation

No data available

Respiratory or skin sensitisation

No data available

Germ cell mutagenicity

No	Substance name	CAS no.	EC no.
1	difluoromethane	75-10-5	200-839-4
Type of examination	in vitro gene mutation study in bacteria		
Species	Salmonella typhimurium / Escherichia coli		
Method	OECD 471		
Source	ECHA		
Evaluation/classification	Based on available data, the classification criteria are not met.		
Type of examination	In vitro Mammalian Chromosomal Aberration Test		
Species	Human Lymphocyte		
Method	OECD 473		
Source	ECHA		
Evaluation/classification	Based on available data, the classification criteria are not met.		
Route of exposure	inhalational		
Duration of exposure		6	h
Type of examination	In vivo mammalian somatic cell study: cytogenicity / erythrocyte micronucleus		
Species	mouse		
Method	OECD 474		
Source	ECHA		
Evaluation/classification	Based on available data, the classification criteria are not met.		
2	2,3,3,3-tetrafluoroprop-1-ene	754-12-1	468-710-7

Trade name: R-452B

Current version: 4.0.0, Revision: 21.05.2026

Replaced version: 3.0.0, Revision: 31.07.2025

Region:
GER

Type of examination	In vitro Mammalian Chromosomal Aberration Test
Species	Human Lymphocyte
Method	OECD 473
Source	ECHA
Evaluation/classification	Based on available data, the classification criteria are not met.
Route of exposure	inhalational
Type of examination	In vivo mammalian somatic cell study: cytogenicity / erythrocyte micronucleus
Species	rat
Method	OECD 474
Source	ECHA
Evaluation/classification	Based on available data, the classification criteria are not met.
3	pentafluoroethane 354-33-6 206-557-8
Type of examination	in vitro gene mutation study in bacteria
Species	Salmonella typhimurium / Escherichia coli
Method	OECD 471
Source	ECHA
Evaluation/classification	Based on available data, the classification criteria are not met.
Type of examination	In vitro Mammalian Chromosomal Aberration Test
Species	Chinese hamster Ovary (CHO)
Method	OECD 473
Source	ECHA
Evaluation/classification	Based on available data, the classification criteria are not met.
Route of exposure	inhalational
Type of examination	Mammalian Erythrocyte Micronucleus Test, In vivo
Species	mouse
Method	OECD 474
Source	ECHA
Evaluation/classification	Based on available data, the classification criteria are not met.

Reproduction toxicity			
No	Substance name	CAS no.	EC no.
1	difluoromethane	75-10-5	200-839-4
Route of exposure	inhalational		
NOAEL	50000	ppm	
Type of examination	Prenatal Developmental Toxicity Study		
Species	rabbit		
Method	OECD 414		
Source	ECHA		
Evaluation/classification	Based on available data, the classification criteria are not met.		
2	2,3,3,3-tetrafluoroprop-1-ene	754-12-1	468-710-7
Route of exposure	inhalational		
NOAEC	>	50000	ppm
Type of examination	2 generation study		
Species	rat		
Method	OECD 416		
Source	ECHA		
Evaluation/classification	Based on available data, the classification criteria are not met.		
Route of exposure	inhalational		
NOAEC	<	2500	ppm
Type of examination	Prenatal Developmental Toxicity Study		
Species	rabbit		
Method	OECD 414		
Source	ECHA		
Evaluation/classification	Based on available data, the classification criteria are not met.		
3	pentafluoroethane	354-33-6	206-557-8
Route of exposure	inhalational		
Type of examination	Prenatal Developmental Toxicity Study		
Species	rabbit		
Method	OECD 414		

Trade name: R-452B

Current version: 4.0.0, Revision: 21.05.2026

Replaced version: 3.0.0, Revision: 31.07.2025

Region:
GER

Source	ECHA
Evaluation/classification	Based on available data, the classification criteria are not met.

Carcinogenicity			
No	Substance name	CAS no.	EC no.
1	difluoromethane	75-10-5	200-839-4
Source		ECHA	
Evaluation/classification		Based on available data, the classification criteria are not met.	

STOT - single exposure			
No data available			

STOT - repeated exposure			
No	Substance name	CAS no.	EC no.
1	difluoromethane	75-10-5	200-839-4
Route of exposure		inhalational	
NOAEL		49100	ppm
Species		rat	
Method		OECD 413	
Source		ECHA	
Evaluation/classification		Based on available data, the classification criteria are not met.	
2	2,3,3,3-tetrafluoroprop-1-ene	754-12-1	468-710-7
Route of exposure		inhalational	
NOAEC		> 50000	ppm
Species		rat	
Method		OECD 413	
Source		ECHA	
Evaluation/classification		Based on available data, the classification criteria are not met.	
3	pentafluoroethane	354-33-6	206-557-8
Route of exposure		inhalational	
Species		rat	
Method		OECD 413	
Source		ECHA	
Evaluation/classification		Based on available data, the classification criteria are not met.	

Aspiration hazard			
No data available			

11.2 Information on other hazards

Endocrine disrupting properties	
Product Name	
R-452B	
Contains no substances identified as having endocrine disrupting properties.	
Source	supplier

Other information

No data available.

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish (acute)			
No	Substance name	CAS no.	EC no.
1	2,3,3,3-tetrafluoroprop-1-ene	754-12-1	468-710-7
LC50		> 197	mg/l
Duration of exposure		96	h
Species		Cyprinus carpio	
Method		OECD 203	
Source		ECHA	
Evaluation/classification		Based on available data, the classification criteria are not met.	

Trade name: R-452B

Current version: 4.0.0, Revision: 21.05.2026

Replaced version: 3.0.0, Revision: 31.07.2025

Region:
GER

Toxicity to fish (chronic)			
No data available			

Toxicity to Daphnia (acute)			
No	Substance name	CAS no.	EC no.
1	2,3,3,3-tetrafluoroprop-1-ene	754-12-1	468-710-7
EC50	>	100	mg/l
Duration of exposure		48	h
Species	Daphnia magna		
Method	OECD 202		
Source	ECHA		
Evaluation/classification	Based on available data, the classification criteria are not met.		

Toxicity to Daphnia (chronic)			
No data available			

Toxicity to algae (acute)			
No	Substance name	CAS no.	EC no.
1	2,3,3,3-tetrafluoroprop-1-ene	754-12-1	468-710-7
EC50	>	100	mg/l
Duration of exposure		72	h
Species	Raphidocelis subcapitata		
Method	OECD 201		
Source	ECHA		
Evaluation/classification	Based on available data, the classification criteria are not met.		

Toxicity to algae (chronic)			
No data available			

Bacteria toxicity			
No data available			

12.2 Persistence and degradability

Biodegradability			
No	Substance name	CAS no.	EC no.
1	difluoromethane	75-10-5	200-839-4
Type	aerobic biodegradation		
Value		5	%
Duration		28	d
Method	OECD 301 D		
Source	ECHA		
Evaluation	not readily biodegradable		
2	2,3,3,3-tetrafluoroprop-1-ene	754-12-1	468-710-7
Type	aerobic biodegradation		
Value	<	5	%
Duration		28	d
Method	OECD 301 F		
Source	ECHA		
Evaluation	not readily biodegradable		
3	pentafluoroethane	354-33-6	206-557-8
Type	aerobic biodegradation		
Value	appr.	5	%
Duration		28	d
Method	Closed Bottle Test (OECD 301D)		
Source	ECHA		
Evaluation	not readily biodegradable		

12.3 Bioaccumulative potential

Partition coefficient n-octanol/water (log value)			
No	Substance name	CAS no.	EC no.

Trade name: R-452B

Current version: 4.0.0, Revision: 21.05.2026

Replaced version: 3.0.0, Revision: 31.07.2025

Region:
GER

1	difluoromethane	75-10-5	200-839-4
log Pow		0,21	
Reference temperature		25	°C
with reference to	pH 6,1		
Method	OECD 107		
Source	ECHA		
2	2,3,3,3-tetrafluoroprop-1-ene	754-12-1	468-710-7
log Pow	appr.	2	
Reference temperature		25	°C
with reference to	pH 7		
Method	OECD 117		
Source	ECHA		
3	pentafluoroethane	354-33-6	206-557-8
log Pow		1,48	
Reference temperature		25	°C
with reference to	pH 6.34		
Method	OECD 107		
Source	ECHA		

12.4 Mobility in soil

No data available.

12.5 Results of PBT and vPvB assessment

Results of PBT and vPvB assessment	
Product Name	
R-452B	
PBT assessment	The product is not considered to be a PBT.
vPvB assessment	The product is not considered to be a vPvB.

12.6 Endocrine disrupting properties

Endocrine disrupting properties	
Product Name	
R-452B	
Contains no substances identified as having endocrine disrupting properties.	
Source	supplier

12.7 Other adverse effects

Other adverse effects	
Product: Global warming potential within 100 years: 697	

SECTION 13: Disposal considerations**13.1 Waste treatment methods****Product**

dispose of in accordance with local regulation.

Allocation of a waste code number, according to the European Waste Catalogue, should be carried out in agreement with the regional waste disposal company.

Packaging

Empty containers contain product residue and may be hazardous. Do not pressurize, cut, weld, braze, solder, drill or expose these containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury and/or death. Residues must be removed from packaging and when emptied completely disposed of in accordance with the regulations for waste removal. Incompletely emptied packaging must be disposed of in the form of disposal specified by the regional disposer.

SECTION 14: Transport information**14.1 UN number or ID number**

ADR/RID/ADN

UN3161

IMDG

UN3161

Trade name: R-452B

Current version: 4.0.0, Revision: 21.05.2026

Replaced version: 3.0.0, Revision: 31.07.2025

Region:
GER

ICAO-TI / IATA

UN3161

14.2 UN proper shipping name**ADR/RID/ADN**

Technical name

LIQUEFIED GAS, FLAMMABLE, N.O.S.

difluoromethane

2,3,3,3-tetrafluoroprop-1-ene

IMDG

Technical name

LIQUEFIED GAS, FLAMMABLE, N.O.S.

difluoromethane

2,3,3,3-tetrafluoroprop-1-ene

ICAO-TI / IATA

Technical name

Liquefied gas, flammable, n.o.s.

difluoromethane

2,3,3,3-tetrafluoroprop-1-ene

14.3 Transport hazard class(es)**ADR/RID/ADN - Class**

2

Label

2.1 RID: (+13)

Classification code

2F

Tunnel restriction code

B/D

Hazard identification no.

23

IMDG - Class

2.1

Label

2.1

ICAO-TI / IATA - Class

2.1

Label

2.1

14.4 Packing group**ADR/RID/ADN**

-

IMDG

-

ICAO-TI / IATA

-

14.5 Environmental hazards

EmS

F-D, S-U

14.6 Special precautions for user

To be transported always in closed, upright and safe containers. Make sure that persons handling these containers are aware of the rules of conduct in case of incident or spillage.

14.7 Maritime transport in bulk according to IMO instruments

Not relevant

SECTION 15: Regulatory information**15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture****EU regulations****Regulation (EC) No 1907/2006 (REACH) Annex XIV (List of substances subject to authorisation)**

According to the data available and/or specifications supplied by upstream suppliers, this product does not contain any substances considered as substances requiring authorisation as listed on Annex XIV of the REACH regulation (EC) 1907/2006.

REACH candidate list of substances of very high concern (SVHC) for authorisation

According to available data and the information provided by preliminary suppliers, the product does not contain substances that are considered substances meeting the criteria for inclusion in annex XIV (List of Substances Subject to Authorisation) as laid down in Article 57 and article 59 of REACH (EC) 1907/2006.

Regulation (EC) No 1907/2006 (REACH) Annex XVII: RESTRICTIONS ON THE MANUFACTURE, PLACING ON THE MARKET AND USE OF CERTAIN DANGEROUS SUBSTANCES, MIXTURES AND ARTICLES

According to the data available and/or specifications supplied by upstream suppliers, this product does not contain any substances subject to restriction as listed in Annex XVII of the REACH regulation (EC) 1907/2006.

Directive 2012/18/EU on the control of major-accident hazards involving dangerous substances

Trade name: R-452B**Current version:** 4.0.0, Revision: 21.05.2026**Replaced version:** 3.0.0, Revision: 31.07.2025**Region:**
GER

This product is not subject to Part 1 or 2 of Annex I.
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Other regulations

REGULATION (EU) No 2024/573 on fluorinated greenhouse gases

Adhere to the national sanitary and occupational safety regulations when using this product.

National regulations**Water Hazard Class (Germany)**

Class

1

Source

Classification according to AwSV (Regulation on facilities for handling substances that are hazardous to water).

Other regulations

Take into account: TRGS 510 "Storage of hazardous substances in non-stationary containers"

15.2 Chemical safety assessment

Chemical safety assessments have been conducted for the substances in this mixture. For a mixture a chemical safety assessment according to (EC) 1907/2006 is not mandatory.

SECTION 16: Other information**Sources of key data used to compile the data sheet:**

Regulation (EC) No 1907/2006 (REACH), 1272/2008 (CLP) as amended in each case.

Directives 2000/39/EC, 2006/15/EC, 2009/161/EU, (EU) 2017/164.

National Threshold Limit Values of the corresponding countries as amended in each case.

Transport regulations according to ADR, RID, IMDG, IATA as amended in each case.

The data sources used to determine physical, toxic and ecotoxic data, are indicated directly in the corresponding section.

Classification information

This product is assessed and classified using the methods and criteria below referred to in Article 9 of Regulation (EC) n° 1272/2008:

Physical hazards: determined through assessment data based on the methods or standards referred to in part 2 of Annex I to CLP

Health hazards and environmental hazards: determined through toxicological and ecotoxicological assessment data based on the methods or standards referred to in Part 3, 4 and 5 of Annex I to CLP.

Creation of the safety data sheet

UMCO GmbH

This information is based on our present knowledge and experience.

The safety data sheet describes products with a view to safety requirements.

It does not however, constitute a guarantee for any specific product properties and shall not establish a legally valid contractual relationship.

Alterations/supplements:

Alterations to the previous edition are marked in the left-hand margin.

This document is an English translation of the legally compliant safety data sheet of the region Germany. This document, including UFI and emergency telephone number, may only be used for placing on the market in the region Germany.

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