

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

1.1. Product identifier

Product form : Mixture
Name : R-428A
Product code : R428A

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

1.2.1. Relevant identified uses

Use of the substance/mixture : Refrigerant

1.2.2. Uses advised against

No additional information available

1.3. Details of the supplier of the safety data sheet

Supplier

Dehon Service SA
26 Avenue du Petit Parc
94683 VINCENNES Cedex - France
T 01 43 98 75 00 - F 01 43 98 21 51
ContactFDS@climalife.dehon.com

Other

IDS Refrigeration Limited
Green Court, Kings Weston Lane
BS11 8AZ Bristol - United Kingdom
T 00 44 1179 802520 - F 00 44 1179 802521
ContactFDS@climalife.dehon.com

Other

Dehon Service Belgium s.a/n.v.
Avenue Carton de Wiart, 79
1090 Bruxelles - Belgium
T 00 32 2 421 01 70 - F 00 32 2 426 96 62
ContactFDS@climalife.dehon.com

1.4. Emergency telephone number

Emergency number : +33 (0) 1 72 11 00 03

Country	Organisation/Company	Address	Emergency number	Comment
United Kingdom	National Poisons Information Service (Birmingham Centre) City Hospital, Guy's & St Thomas' Hospital Trust	Dudley Road B18 7QH Birmingham	0844 892 0111 (UK only, Monday to Friday, 08.00 to 18.00 hours)	

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Liquefied gas H280

Full text of hazard classes and H-statements : see section 16

Adverse physicochemical, human health and environmental effects

No additional information available

2.2. Label elements

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

Hazard pictograms (CLP) :



GHS04

Signal word (CLP) :

Warning

Hazard statements (CLP) :

H280 - Contains gas under pressure; may explode if heated

Precautionary statements (CLP) :

P410+P403 - Protect from sunlight. Store in a well-ventilated place

Extra phrases :

Greenhouse fluorinated gas falling within Kyoto Protocol (GWP=3607)

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2.3. Other hazards

Other hazards not contributing to the classification : May cause suffocation by reducing oxygen available for breathing. Contact with the liquid the may cause cold burns/frostbite.

SECTION 3: Composition/information on ingredients

3.1. Substance

Not applicable

3.2. Mixture

Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP]
Pentafluoroethane	(CAS No) 354-33-6 (EC no) 206-557-8 (REACH-no) 01-2119485636-25	77.5	Liquefied gas, H280
1,1,1-Trifluoroethane	(CAS No) 420-46-2 (EC no) 206-996-5 (REACH-no) 01-2119492869-13	20	Flam. Gas 1, H220 Liquefied gas, H280
Isobutane	(CAS No) 75-28-5 (EC no) 200-857-2 (EC index no) 601-004-00-0 (REACH-no) 01-2119485395-27	1.9	Flam. Gas 1, H220 Liquefied gas, H280
propane (Note U)	(CAS No) 74-98-6 (EC no) 200-827-9 (EC index no) 601-003-00-5 (REACH-no) 01-2119486944-21	0.6	Flam. Gas 1, H220 Liquefied gas, H280

Note U : When put on the market gases have to be classified as 'Gases under pressure', in one of the groups compressed gas, liquefied gas, refrigerated liquefied gas or dissolved gas. The group depends on the physical state in which the gas is packaged and therefore has to be assigned case by case.

Full text of H-statements: see section 16

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures after inhalation : Move the affected person away from the contaminated area and into the fresh air. If you feel unwell, seek medical advice.

First-aid measures after skin contact : In the event of contact with the liquid: treat resulting frostbite as a burn. Immediately remove contaminated clothing or footwear. Immediately rinse with plenty of water. If skin burns appear, call a doctor immediately.

First-aid measures after eye contact : Rinse immediately and thoroughly, pulling the eyelids well away from the eye (15 minutes minimum). Consult an eye specialist immediately.

First-aid measures after ingestion : Not specifically applicable (gas).

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries : CNS depression. Narcosis. Cardiac disorders. Lack of oxygen: risk of death.

4.3. Indication of any immediate medical attention and special treatment needed

No additional information available

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : Water spray. Foam. Carbon dioxide. Chemical powder.

5.2. Special hazards arising from the substance or mixture

Fire hazard : Non-flammable gas. Under certain temperature and pressure conditions may form a flammable mixture in the presence of air.

Explosion hazard : Heating will cause a rise in pressure with a risk of bursting.

Hazardous decomposition products in case of fire : Toxic and corrosive vapours may be released. Hydrogen fluoride.

5.3. Advice for firefighters

Firefighting instructions : Use water spray or fog for cooling exposed containers.

Protection during firefighting : Self-contained breathing apparatus. Complete protective clothing.

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SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures : Avoid contact with skin and eyes. Evacuate the danger area. Do not breathe smoke. Stop the leak. In closed premises : Ventilate or wear self-contained breathing apparatus (risk of asphyxia). Remove all sources of ignition. Do not smoke.

6.1.1. For non-emergency personnel

No additional information available

6.1.2. For emergency responders

No additional information available

6.2. Environmental precautions

Avoid release to the environment.

6.3. Methods and material for containment and cleaning up

Other information : Mechanically ventilate the spillage area.

6.4. Reference to other sections

For further information refer to section 8: "Exposure controls/personal protection".

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Ventilation. Remove all sources of ignition. Use personal protective equipment as required.

Hygiene measures : Do not drink, eat or smoke in the workplace.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions : Store in a dry, well ventilated place away from sources of heat, ignition and direct sunlight.
Store in original container.

Packaging materials : Recommended materials: Carbon steel, Stainless steel.

7.3. Specific end use(s)

No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Pentafluoroethane (354-33-6)		
EU	IOELV TWA (mg/m ³)	4900 mg/m ³ (recommended)
EU	IOELV TWA (ppm)	1000 ppm (recommended)
Isobutane (75-28-5)		
Belgium	Local name	Hydrocarbures aliphatiques sous forme gazeuse : (Alcanes C1-C4)
Belgium	Limit value (ppm)	1000 ppm
Germany	Local name	Isobutan
Germany	TRGS 900 Occupational exposure limit value (mg/m ³)	2400 mg/m ³
Germany	TRGS 900 Occupational exposure limit value (ppm)	1000 ppm
Germany	Remark (TRGS 900)	DFG
Slovenia	Local name	izobutan
Slovenia	OEL TWA (mg/m ³)	2400 mg/m ³
Slovenia	OEL TWA (ppm)	1000 ppm
Slovenia	OEL STEL (mg/m ³)	9600 mg/m ³
Slovenia	OEL STEL (ppm)	4000 ppm
USA - ACGIH	Local name	Butane, all isomers
USA - ACGIH	ACGIH STEL (ppm)	1000 ppm
propane (74-98-6)		
Belgium	Limit value (ppm)	1000 ppm
Finland	HTP-arvo (8h) (mg/m ³)	1500 mg/m ³
Finland	HTP-arvo (8h) (ppm)	800 ppm
Finland	HTP-arvo (15 min)	2000 mg/m ³
Finland	HTP-arvo (15 min) (ppm)	1100 ppm
Germany	TRGS 900 Occupational exposure limit value (mg/m ³)	1800 mg/m ³
Germany	TRGS 900 Occupational exposure limit value (ppm)	1000 ppm

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propane (74-98-6)		
Poland	NDS (mg/m ³)	1800 mg/m ³
Slovenia	OEL TWA (mg/m ³)	1800 mg/m ³
Slovenia	OEL TWA (ppm)	1000 ppm
Slovenia	OEL STEL (mg/m ³)	7200 mg/m ³
Slovenia	OEL STEL (ppm)	4000 ppm
Norway	Local name	Propan
Norway	Grenseverdier (AN) (mg/m ³)	900 mg/m ³
Norway	Grenseverdier (AN) (ppm)	500 ppm
Switzerland	VME (mg/m ³)	1800 mg/m ³
Switzerland	VME (ppm)	1000 ppm
Switzerland	VLE (mg/m ³)	7200 mg/m ³
Switzerland	VLE (ppm)	4000 ppm
USA - OSHA	Local name	Propane
USA - OSHA	OSHA PEL (TWA) (mg/m ³)	1800 mg/m ³
USA - OSHA	OSHA PEL (TWA) (ppm)	1000 ppm

Pentafluoroethane (354-33-6)	
DNEL/DMEL (Workers)	
Long-term - systemic effects, inhalation	16444 mg/m ³
DNEL/DMEL (General population)	
Long-term - systemic effects, inhalation	1753 mg/m ³
PNEC (Water)	
PNEC aqua (freshwater)	0.1 mg/l
PNEC aqua (intermittent, freshwater)	1 mg/l
PNEC (Sediment)	
PNEC sediment (freshwater)	0.6 mg/kg dwt
1,1,1-Trifluoroethane (420-46-2)	
DNEL/DMEL (Workers)	
Long-term - systemic effects, inhalation	38800 mg/m ³
DNEL/DMEL (General population)	
Long-term - systemic effects, inhalation	10700 mg/m ³
PNEC (Water)	
PNEC aqua (freshwater)	0.35 mg/l

8.2. Exposure controls

Hand protection:

Leather protective gloves. Nitrile-rubber protective gloves. VITON gloves

Eye protection:

Safety glasses with side shields

Skin and body protection:

Majority cotton protective clothing

Respiratory protection:

In the event of insufficient ventilation: Gas mask with filter type AX. In a confined area : Self-contained breathing apparatus

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	: Gas
Appearance	: Liquefied gas.
Colour	: Colourless.
Odour	: No data available
Odour threshold	: No data available
pH	: Not applicable

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Relative evaporation rate (butylacetate=1)	: No data available
Melting point	: No data available
Freezing point	: No data available
Boiling point	: -46.7 °C
Flash point	: Not applicable
Critical temperature	: 73 °C
Auto-ignition temperature	: No data available
Decomposition temperature	: No data available
Flammability (solid, gas)	: Non flammable
Vapour pressure	: 13.45 bar (25°C)
Vapour pressure at 50 °C	: 24.63 bar (50°C)
Critical pressure	: 37.65 bar
Relative vapour density at 20 °C	: No data available
Relative density	: No data available
Density	: 1.087 g/cm ³ (25°C)
Solubility	: Insoluble in water.
Log Pow	: No data available
Viscosity, kinematic	: No data available
Viscosity, dynamic	: No data available
Explosive properties	: Not explosive material according to EC criteria.
Oxidising properties	: Non oxidizing material according to EC criteria.
Explosive limits	: No data available

9.2. Other information

Gas group : Liquefied gas

SECTION 10: Stability and reactivity

10.1. Reactivity

Contains gas under pressure; may explode if heated.

10.2. Chemical stability

Stable at ambient temperature and under normal conditions of use.

10.3. Possibility of hazardous reactions

No dangerous polymerization.

10.4. Conditions to avoid

Ignition sources. Heat or source of heat. Avoid contact with hot surfaces.

10.5. Incompatible materials

alkali metals. Alkaline earth metals. Finely divided metals (Al, Mg, Zn). Sodium (Na). Potassium (K). Barium (Ba).

10.6. Hazardous decomposition products

On thermal decomposition (pyrolysis), releases : Carbon oxides (CO, CO₂), Hydrogen fluoride.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity	: Not classified
Additional information	: Asphyxiating

Pentafluoroethane (354-33-6)

LC50 inhalation rat (ppm)	800000 ppm/4h
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1,1,1-Trifluoroethane (420-46-2)

LC50 inhalation rat (ppm)	591000 ppm/4h
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Isobutane (75-28-5)

LC50 inhalation rat (mg/l)	658 mg/l/4h
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Skin corrosion/irritation	: Not classified pH: Not applicable
Additional information	: Contact with the liquid the may cause cold burns/frostbite
Serious eye damage/irritation	: Not classified pH: Not applicable

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Additional information	: Contact with the liquefied gas may cause severe ocular lesions
Respiratory or skin sensitisation	: Not classified
Germ cell mutagenicity	: Not classified
Carcinogenicity	: Not classified
Reproductive toxicity	: Not classified
Specific target organ toxicity (single exposure)	: Not classified
Specific target organ toxicity (repeated exposure)	: Not classified
Aspiration hazard	: Not classified

SECTION 12: Ecological information

12.1. Toxicity

Pentafluoroethane (354-33-6)	
LC50 fish 1	> 100 mg/l 96 Hours (Oncorhynchus mykiss)
EC50 Daphnia 1	> 100 mg/l 48 Hours (Daphnia magna)
EC50 72h algae (1)	> 114 mg/l 72 Hours (Pseudokirchneriella subcapitata)
1,1,1-Trifluoroethane (420-46-2)	
LC50 fish 1	> 40 mg/l Oncorhynchus mykiss (Rainbow trout)
LC50 fish 2	109 mg/l (freshwater)
EC50 Daphnia 1	115 - 300 mg/l 48 Hours (Daphnia magna)
EC50 96h algae (1)	71 mg/l
NOEC chronic algae	> 44 mg/l selenastrum capricornutum

12.2. Persistence and degradability

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Persistence and degradability	Not readily biodegradable.
Pentafluoroethane (354-33-6)	
Persistence and degradability	5 % biodegradation after 28 days.
1,1,1-Trifluoroethane (420-46-2)	
Persistence and degradability	3 % biodegradation after 28 days.
Isobutane (75-28-5)	
Persistence and degradability	< 60 % biodegradation after 28 days.
propane (74-98-6)	
Persistence and degradability	< 60 % biodegradation after 28 days.

12.3. Bioaccumulative potential

Pentafluoroethane (354-33-6)	
Log Pow	1.48
1,1,1-Trifluoroethane (420-46-2)	
Log Pow	1.73

12.4. Mobility in soil

Pentafluoroethane (354-33-6)	
Log Koc	1.3 - 1.7

12.5. Results of PBT and vPvB assessment

Component	
1,1,1-Trifluoroethane (420-46-2)	This substance/mixture does not meet the PBT criteria of REACH regulation, annex XIII This substance/mixture does not meet the vPvB criteria of REACH regulation, annex XIII
Pentafluoroethane (354-33-6)	This substance/mixture does not meet the PBT criteria of REACH regulation, annex XIII This substance/mixture does not meet the vPvB criteria of REACH regulation, annex XIII
Isobutane (75-28-5)	This substance/mixture does not meet the PBT criteria of REACH regulation, annex XIII This substance/mixture does not meet the vPvB criteria of REACH regulation, annex XIII
propane (74-98-6)	This substance/mixture does not meet the PBT criteria of REACH regulation, annex XIII This substance/mixture does not meet the vPvB criteria of REACH regulation, annex XIII

12.6. Other adverse effects

No additional information available

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SECTION 13: Disposal considerations

13.1. Waste treatment methods

- Waste treatment methods : Do not allow product to spread into the environment.
- Waste disposal recommendations : Refer to manufacturer or supplier for information on recovery or recycling. Return to the supplier.
- Additional information : The user's attention is drawn to the possible existence of specific european, national or local regulations regarding disposal.

SECTION 14: Transport information

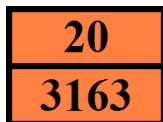
In accordance with ADR / IATA / IMDG

ADR	IMDG	IATA
14.1. UN number		
3163	3163	3163
14.2. UN proper shipping name		
LIQUEFIED GAS, N.O.S. (Chlorodifluoromethane ; 1,1,1-Trifluoroethane ; Pentafluoroethane)	LIQUEFIED GAS, N.O.S. (Chlorodifluoromethane ; 1,1,1-Trifluoroethane ; Pentafluoroethane)	Liquefied gas, n.o.s. (Chlorodifluoromethane ; 1,1,1-Trifluoroethane ; Pentafluoroethane)
Transport document description		
UN 3163 LIQUEFIED GAS, N.O.S. (Chlorodifluoromethane ; 1,1,1-Trifluoroethane ; Pentafluoroethane), 2.2, (C/E)	UN 3163 LIQUEFIED GAS, N.O.S. (Chlorodifluoromethane ; 1,1,1-Trifluoroethane ; Pentafluoroethane), 2.2	UN 3163 Liquefied gas, n.o.s. (Chlorodifluoromethane ; 1,1,1-Trifluoroethane ; Pentafluoroethane), 2.2
14.3. Transport hazard class(es)		
2.2	2.2	2.2
		
14.4. Packing group		
Not applicable	Not applicable	Not applicable
14.5. Environmental hazards		
Dangerous for the environment : No	Dangerous for the environment : No Marine pollutant : No	Dangerous for the environment : No
No supplementary information available		

14.6. Special precautions for user

- Overland transport

- Classification code (ADR) : 2A
- Special provisions (ADR) : 274, 662
- Limited quantities (ADR) : 120ml
- Tank code (ADR) : PxBN(M)
- Transport category (ADR) : 3
- Hazard identification number (Kemler No.) : 20
- Orange plates :



- Tunnel restriction code (ADR) : C/E
- EAC code : 2TE

- Transport by sea

- Special provisions (IMDG) : 274
- Limited quantities (IMDG) : 120 ml
- EmS-No. (Fire) : F-C
- EmS-No. (Spillage) : S-V

- Air transport

- PCA Limited quantities (IATA) : Forbidden
- PCA limited quantity max net quantity (IATA) : Forbidden
- PCA packing instructions (IATA) : 200
- PCA max net quantity (IATA) : 75kg

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CAO packing instructions (IATA) : 200

CAO max net quantity (IATA) : 150kg

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

Not applicable

SECTION 15: Regulatory information

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

15.1.1. EU-Regulations

Contains no REACH substances with Annex XVII restrictions

Contains no substance on the REACH candidate list

Contains no REACH Annex XIV substances

15.1.2. National regulations

Ensure all national/local regulations are observed

Germany

VwVwS Annex reference : Water hazard class (WGK) 1, low hazard to waters (Classification according to VwVwS, Annex 3)

12th Ordinance Implementing the Federal Immission Control Act - 12.BImSchV : Is not subject of the 12. BImSchV (Hazardous Incident Ordinance)

Netherlands

SZW-lijst van kankerverwekkende stoffen : None of the components are listed

SZW-lijst van mutagene stoffen : None of the components are listed

NIET-limitatieve lijst van voor de voortplanting giftige stoffen – Borstvoeding : None of the components are listed

NIET-limitatieve lijst van voor de voortplanting giftige stoffen – Vruchtbaarheid : None of the components are listed

NIET-limitatieve lijst van voor de voortplanting giftige stoffen – Ontwikkeling : None of the components are listed

15.2. Chemical safety assessment

Not applicable

SECTION 16: Other information

Other information : For more information regarding the use of this product, please refer to our technical information or contact the sales department in your region.

Full text of H- and EUH-statements:

Flam. Gas 1	Flammable gases, Category 1
Liquefied gas	Gases under pressure : Liquefied gas
H220	Extremely flammable gas
H280	Contains gas under pressure; may explode if heated

SDS EU (REACH Annex II)

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product