1. Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Commercial name	R422B
Chemical description	Mixture composed of Pentafluoroethane (HFC R125), 1,1,1,2-Tetrafluoroethane (HFC R134a), Isobutane (HC R600a) Chemical formula: C2HF5+ C2H2F4+C4H10

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

Industrial sector	Refrigeration and air-conditioning
Relevant identified uses	Refrigerant gas for air-conditioning systems
Application	Industrial and professional

1.3 Details of the supplier of the safety data sheet

REFRIGERANT BOYS S.R.L.
Corso XX Settembre
21052 - Busto Arsizio VA
tel: +39 329 1858456
mail: service@refrigerantboys.it

1.4 Emergency telephone number

CAV-CNIT Anti-Poison (toxicological) National Information Centre +39 0382 24444 Hours: 24 h / 24 h

2. Hazards identification

2.1 Classification of the substance or mixture

Classification under Regulation (EC) 1272/2008 (CLP)

H280: Contains gas under pressure; may explode if heated.

2.2 Label elements

Dangerous pictogram

GHS04

Signal word	Warning	
Hazard statements (H)	H280	Contains gas under pressure; may explode if heated.
Precautionary statements (P)	P410	Protect from sunlight.
	P403	Store in a well-ventilated place.
Other information	Contains greenhouse gases disciplined by Kyoto Protocol	

2.3 Other hazards

Vapours are heavier than air and can cause rapid suffocation by reducing oxygen available for breathing.
Contact with liquid can cause frostbite and severe damage to the eyes.

3. Composition/information on ingredients

3.2 Mixtures

Substance name	%	CAS No.	EC No.	REACH No.	Classification Reg. (CE) 1272/2008 (CLP) and Directive 67/548/EEC
Pentafluoroethane	55%	354-33-6	206-557-8	01-2119485636-25-0025	Press. Gas (Liq.), H280
1,1,1,2-Tetrafluoroethane	42%	811-97-2	212-377-0	01-2119459374-33-0012	Press. Gas (Liq.), H280
Isobutane	3%	75.28.5	200-857-2	01-2119485395-27-XXX	Flam. Gas 1, H220 Press. Gas (Liq.), H280 F+ ; R12

For more information, see sections 8, 11, 12 and 16.

4. First aid measures

General information: If the person is unconscious, place it in the recovery position and get immediately medical attention. Take off all contaminated clothing immediately. Do not give anything to an unconscious person. If breathing is irregular, give oxygen. If breathing stopped, administer artificial respiration. If symptoms persist, call a physician.
Notes to physician: Do not give adrenaline-ephedrine or similar drugs group.

4.1 Description of first aid measures

Inhalation	Move to fresh air. If breathing is difficult, give oxygen. Call a physician.
Skin contact	The rapid evaporation of the liquid may cause frostbite. In case of contact with skin, thaw frosted parts with water, then remove clothing carefully. Consult a physician in case of persistent pain.
Eye contact	Remove contact lenses. Immediately flush eyes with plenty of water, also under the eyelids, for at least 15 minutes. Consult a doctor.
Ingestion	Ingestion is unlikely because of the physical properties and is not expected to be hazardous (gas). Refer to the inhalation section.

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

In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. In low concentrations may cause narcotic effects. Symptoms may include dizziness, headache, nausea and loss of coordination

5. Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media	Water spray, alcohol-resistant foam, dry chemical or CO2
No suitable extinguishing media	None to our knowledge

5.2 Special hazards arising from the substance or mixture

Specific hazards Contents under pressure.
On heating: heating will cause a rise in pressure with a risk of bursting.
Toxic and corrosive vapours are released.
Cool down the containers exposed to heat with a water spray.
Vapours are heavier than air and can cause rapid suffocation by reducing oxygen available for breathing.

5.3 Advice for firefighters

Wear self-contained positive pressure breathing apparatus (SCBA) and protective suit.
Avoid contact with skin and eyes.
Do not breathe gas/fumes/vapour.

Other information

Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
For more information, see section 10.

6. Accidental release measure

6.1 Personal precautions, protective equipment and emergency procedures

Immediately contact emergency personnel.
Immediately evacuate personnel to safe areas. Unprotected persons must be kept away.
Wear personal protective equipment refer to section 8 "Exposure controls/personal protection".
Remove all sources of ignition.
Avoid contact with skin (possible frostbite).
Ventilate the area/local. In case of insufficient ventilation, wear self-contained breathing apparatus.

6.2 Environmental precautions

Do not allow product to spread into the environment. Avoid spillage and prevent possible losses.

6.3 Methods and material for containment and cleaning up

Ventilate / aerate the area or local.

6.4 Reference to other sections

For further information on personal protection, refer to section 8 and 13.

7. Handling and storage

7.1 Precautions for safe handling

Technical measures
Handle and open container with care. Caution when opening, pressurized container.
Protect from sunlight and do not expose to temperatures exceeding 50° C (122 °F).
Do not spray on a naked flame or any incandescent material.
Do not use in area without adequate ventilation.
Do not pierce or burn, even after use.
Leave valve protection caps in place until the container is ready for use.
Follow the general precautions for handling, storing, and using compressed gases.

Industrial hygiene
Ensure adequate ventilation of the working area.
Do not drink, eat or smoke in the working area.

7.2 Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers
Keep containers tightly closed in a dry, cool and well-ventilated place, away from any ignition or heat sources.
Store in original container. Protect from sunlight and do not expose to temperatures exceeding 50° C (122 °F).

7.3 Specific end use(s)

For professional and industrial use only.

8. Exposure controls/personal protection

8.1 Control parameters

OEL (Occupational Exposure Limit): No exposure limit was defined for any component of the mixture.

Components	CAS No.	TLV-TWA	Parameters	Font	Year
Pentafluoroethane	354-33-6	8 h	4.900 mg/m³ 1.000 ppm	ACGIH (WEEL)	//
1,1,1,2-Tetrafluoroethane	811-97-2	8 h	4,240 mg/m³ 1,000 ppm	AGCIH	OES (UK) 2002
		15 min.	9,740 mg/m³ 1,250 ppm		
Isobutane	75-28-5	8 h	1,900 mg/m³ 800 ppm	AGCIH	2010

DNEL			
Component	**CAS No.**	**Inhalation**	
Pentafluoroethane	354-33-6	DNEL - Workers DNEL – Consumers	16444 mg/m³ (long-term exposure – systemic effects) 1753 mg/m³ (long-term exposure – systemic effects)
1,1,1,2-Tetrafluoroethane	811-97-2	DNEL – Workers DNEL – Consumers	13936 mg/m³ (long-term exposure – systemic effects) 2476 mg/m³ (long-term exposure – systemic effects)

PNEC			
Component	**N. CAS**	**PNEC values**	
Pentafluoroethane	354-33-6	0,1 mg/l 0,6 mg/kg dw* 1 mg/l	Fresh water Fresh water sediment Intermittent release
1,1,1,2-Tetrafluoroethane	811-97-2	0,1 mg/l 0,75 mg/kg dw* 1 mg/l 0,01 mg/l 73 mg/l	Fresh water Fresh water sediment Intermittent release Marine water Sew age treatment plant

*dry weight

8.2 Exposure controls

Ensure adequate ventilation. In case of insufficient ventilation, wear self-contained breathing apparatus.
Wash the hands before and after using the gas. Do not smoke.
Personal protective equipment must comply with EU directives: respiratory protective equipment EN 136, 140, 149; eye protection (protective goggles or safety glasses) EN 166; skin protection EN 340, 463, 468, 943-1, 943-2; hands protection (protective gloves) EN374, safety boots EN ISO 20345.

8.2.2 Individual protection measures, such as personal protective equipment

a) Eye/face protection Safety glasses with side-shields (according to directive EN 166).

b) Skin protection

i) Hand protection: It is recommended to use protective gloves against cold (EN 511).
The penetration time of the gloves must be greater than the period of expected use. Gloves should be replaced immediately if they show signs of wear or deterioration.

ii) Other: Apron or protective clothing are not necessary.

c) Respiratory protection The vapours are heavier than air and can cause asphyxia caused to an reduction of oxygen level. In case of insufficient ventilation, wear self-contained breathing apparatus (EN 133).

8.2.3. Environmental exposure controls

Handling in accordance with good industrial hygiene and safety practice.
Avoid leakage or spillage in the environmental.
Avoid dispersion in the air.
For more information, see section 7 and 13.

9. Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	**Appearance**	Liquefied gas
	Colour	Colorless
b)	**Odour**	Ethereal
c)	**Odour threshold**	Odour threshold is subjective and inadequate to warn for overexposure

d)	**pH**	Not applicable to gas and mixtures
e)	**Melting point**	- 103 °C (- 154.4 °F) Pentafluoroethane - 101 °C (- 149.8 °F) 1,1,1,2-Tetrafluoroethane
f)	**Initial boiling point**	- 43,9 °C (- 47.02 °F)
g)	**Flash point**	> 550 °C (1.022 °F)
h)	**Evaporation rate**	n.a.
i)	**Flammability (solid, liquid)**	n.a.
j)	**Upper/Lower flammability**	n.a.
k)	**Vapour pressure**	n.d.a.
l)	**Vapour density**	5,98 g/m³
m)	**Relative density**	Heavier than air (air = 1.0)
n)	**Solubility** (water)	280000 Pentafluoroethane 1930 1,1,1,2-Tetrafluoroethane
o)	**Partition coefficient: n-Octanol/water**	1,48 log Pow Pentafluoroethane 1,06 log Pow 1,1,1,2-Tetrafluoroethane
q)	**Auto-ignition temperature**	Not applicable to gas and mixtures
r)	**Decomposition temperature**	Not applicable to gas and mixtures
s)	**Viscosity**	n.a.
t)	**Explosive properties**	n.a.
u)	**Oxidising properties**	n.a.

10. Stability and reactivity

10.1 Reactivity

Stable under recommended storage conditions.

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

The product is non-reactive under normal conditions.

10.4 Conditions to avoid

Contains gas under pressure, may explode if heated.
Protect from sunlight and do not expose to temperatures exceeding 50 °C.
Keep away from heat, sparks, open flame or other sources of ignition. Do not smoke.
Do not pierce or burn, even after use.
Do not spray on a naked flame or any incandescent material.

10.5 Incompatible materials

No reaction with common materials in dry or wet conditions.

10.6 Hazardous decomposition products

No hazardous decomposition under normal conditions.
In case of fire, for thermal decomposition, the following substances can be released: halogen acids, carbon oxides (CO, CO2), fluorocarbons, carbonyl halides.

11. Toxicological information

11.1 Information on toxicological effects

a) Acute toxicity

Inhalation

Pentafluoroethane	LC50: > 800000 ppm (OECD 403) Exposure time: 4 h Animal species: Rat

1,1,1,2-Tetrafluoroethane	LC50: > 500000 ppm Exposure time: 4 h Animal species: Rat

b) Skin corrosion/Skin irritation Based on available data the classification criteria are not met.

c) Serious eye damage/irritation Based on available data the classification criteria are not met.

d) Respiratory or skin sensitisation

Pentafluoroethane	LC50: > 800000 ppm Exposure time: 4 h Animal species: Rat
1,1,1,2-Tetrafluoroethane	LC50: > 500000 ppm Exposure time: 4 h Animal species: Rat

e) Germ cell mutagenicity

In vitro genotoxicity

Pentafluoroethane	Test: Ames Result: Negative
1,1,1,2-Tetrafluoroethane	In vitro tests no showed mutagenic effects.

f) Carcinogenicity Based on available data the classification criteria are not met.

g) Reproductive toxicity Based on available data the classification criteria are not met.

h) STOT-single exposure Based on available data the classification criteria are not met.

i) STOT-repeated exposure

Pentafluoroethane	Inhalation (Grouping of substances and read-across approach, key study) NOAEL: ≥ 50000 ppm Animal species: Rat
1,1,1,2-Tetrafluoroethane	Inhalation (Grouping of substances and read-across approach, key study) NOAEL: 100000 ppm Animal species: Rat
Isobutane	Inhalation (Grouping of substances and read-across approach, key study) NOAEL: 10000 PPM Animal species: Rat

j) Aspiration hazard Based on available data the classification criteria are not met.

Other information

Pentafluoroethane	Cardiac sensitization NOAEC: 100000 ppm Animal species: Dog LOAEC: 75000 ppm Animal species: Dog
1,1,1,2-Tetrafluoroethane	Cardiac sensitization NOAEC: 40000 ppm Animal species: Dog LOAEC: 80000 ppm Animal species: Dog

12. Ecological information

12.1 Toxicity

Fish

Pentafluoroethane	LC50: > 100 mg/l Exposition time: 96 h Species: Oncorhynchus mykiss (Rainbow trout)

1,1,1,2-Tetrafluoroethane	LC50: 450 mg/l Exposition time: 96 h Species: Oncorhynchus mykiss (Rainbow trout)

Daphnia magna

Pentafluoroethane	EC50: > 100 mg/l Exposition time: 48 h Species: Daphnia magna (Water flea)
1,1,1,2-Tetrafluoroethane	EC50: 980 mg/l Exposition time: 48 h Species: Daphnia magna (Water flea)

Algae

Pentafluoroethane	EC50: > 114 mg/l Exposition time: 72 h Species: Selenastrum capricornutum (Fresh water algae)
1,1,1,2-Tetrafluoroethane	EC50: > 118 mg/l Exposition time: 72 h Species: Selenastrum capricornutum (Fresh water algae)

12.2 Persistence and degradability

The mixture is not easily biodegradable.

Pentafluoroethane	Water: 5% of biodegradation after 28 days Air: average life of 28.3 years (estimated value)
1,1,1,2-Tetrafluoroethane	Water: 3% of biodegradation after 28 days Air: average life of 9.7 years

12.3 Bioaccumulative potential

1,1,1,2-Tetrafluoroetano 1,06 log Pow

12.4 Mobility in soil

Pentafluoroethane 1,30 – 1,70 log Koc
1,1,1,2-Tetrafluoroethane 1,50 log Koc

12.5 Results of PBT and vPvB assessment

Not classified as PBT or vPvB.

12.6 Other adverse effects

Ozone Depletion Potential ODP (R-11=1) = 0
Global Warming Potential GWP (CO2=1) = 1.774

13. Disposal consideration

13.1 Waste treatment methods

Product	Take all necessary measures to prevent the production of residuals, value the possible methods of regeneration or recycling. Dispose in accordance with local, state, and federal regulations. Do not discharge into drains or environment.
Packaging	Reuse and recycle the packaging after its reclaim. Dispose of non-reusable packaging in accordance with local, state, and federal regulations.

European Waste Code (EWC)

Product 14.06.01: organic solvents, refrigerants and foam / aerosol propellants of waste-chlorofluorocarbons, HCFC, HFC.
Packaging 15.01.11: metallic packaging containing a hazardous solid porous matrix (for example asbestos), including empty pressure containers.

Additional information

Waste directives and regulations: Directive 2006/12/CE, Directive 91/689/CE, Regulation (EC) no. 1013/2006.
Dispose of waste product in compliance with EC, state and/or local regulations.
For more information, see section 8.

14. Transport information

14.1 UN Number UN 3163

14.2 UN proper shipping name Liquefied gas, N.O.S. (R422B)

Hazard labels
ADR/RID, IMDG, IATA/ICAO

2.2 Non-flammable, Non-toxic gas

ADR (Transport by road) / RID (Transport by rail)

14.3 Transport hazard class(es)	2
Classification code	2A
Kemler code	20
14.4 Packing group	n.a.
Packing instruction	P200
14.5 Environmental hazards	No
Additional information	
Tunnel restriction code of total load	Code C/E - Tank carriage: Passage forbidden through tunnels of category C, D & E Code E (Other carriage): Passage forbidden through tunnels of category E

IATA/ICAO (Transport by air)

14.3 Transport hazard class(es)	2.
Class/Division	2.2
14.4 Packing group	n.a.
Passengers and Cargo flights	200
Only Cargo flights	200
14.5 Environmental hazards	No

IMDG (Transport by sea)

14.3 Transport hazard class(es)	2
Class/Code	2.2
Emergency Schedule (EmS)	F-C, S-V
14.4 Packing group	n.a.
Packing instruction	P200
14.5 Environmental hazards	No

14.6 Special precautions for user

Avoid transport on vehicles where the load space is not separated from the driver's compartment.
Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency.
Ensure that containers are firmly secured.
Ensure there is adequate ventilation.

14.7 Transport in bulk according in Annex II of MarPol and the IBC Code

Not applicable.

15. Regulatory information

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

Ozone Depletion Potential ODP (R-11=1) = 0
Global Warming Potential GWP (CO2=1) = 2.526

Additional regulations/legislations

Regulation (UE) n. 517/2014
Seveso Directive: 2012/18/UE (Seveso III): Included.

15.2 Chemical safety assessment

A Chemical Safety Assessment (CSA) does not need to be carried out for this product.

16. Other information

This Material Safety Data Sheet has been made according EU regulation in force.

Text of H and P phrases in section 2 and 3

H220 Extremely flammable gas
H280 Contains gas under pressure; may explode if heated.
P410 Protect from sunlight.
P403 Store in a well-ventilated place.

Text of "Security code" in section 3; under Regulation (EC) 1272/2008 (CLP) and Classification n. 67/548/EEC

Press. Gas (Liq.)	Pressurized gas : Liquefied gas
F+	Extremely Flammable
R12	Extremely flammable: liquids having a boiling point lower or equal to 35 °C

History	Version 2	Version 1
	Revision date: 05/2019	Date: 01/2012

b) Abbreviations and acronyms

ADR	Accord Dangerous Route
CAS	Chemical Abstracts Service
CE / EC	European Community
CLP	Classification, Labelling and Packaging
CSA	Chemical Safety Assessment
DNEL	Derived No-Effect Level
EC50	Effective Concentration 50%
EmS	Emergency Schedule
EWC	European Waste Code
GHS	Globally Harmonised System
GWP	Global Warming Potential
HCFC	Hydro-Chloro-Fluoro-Carbons
HFC	Hydro-Fluoro-Carbons
IATA	International Air Transport Association
IBC code	International Bulk Chemical code
ICAO	International Civil Aviation Organization
IMDG code	International Maritime Dangerous Goods code
LC50	Lethal Concentration 50%
LOAEC	Lowest Observed Adverse Effect Concentration
MARPOL	MARitime POLlution
Log Pow	Logarithm Partition coefficient n-Octanol/Water
Log Koc	Logarithm Partition coefficient Soil Organic Carbon /Water
n.a.	not applicable
n.d.a.	no data available
NOAEC	No Observed Adverse Concentration Level
NOAEL	No Observed Adverse Effect Level
ODP	Ozone Depleting Potential
OECD	Organisation for Economic Co-operation and Development
OEL	Occupational Exposure Limit
PBT	Persistent Bio-accumulative Toxic (substance)
PNEC	Predicted No Effect Concentration
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals (Regulation (EC) n. 1907/2006)
RID	Rail International Dangerous Goods
STOT-RE	Specific Target Effect Concentration (Repeated Exposure)
STOT-SE	Specific Target Effect Concentration (Single Exposure)
TLV	Threshold Limit Value

TWA	Time Weighted Average
UE / EU	European Union
vPvB	very Persistent very Bioaccumulative

Notice of liability

This information should not constitute a guarantee for any specific product properties. This information are only a guidance for safe handling, use, processing, storage, transportation, disposal and release and are not to be considered a warranty or a quality specification.