

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

1.1 Product identifier

Commercial name	R600a < 1000 ml
Our code	TR600BB
Chemical description	Isobutane, I-Butane No. CAS: 75-28-5 No. CE: 200-857-2 EU Index number: 601-004-00-0 REACH registration number: 01-2119485395-27

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

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

1.3 Details of the supplier of the safety data sheet



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1.4 Emergency telephone number

Mariel Srl	+39 0322 838319	Mon./Fri.: 8.30-12.30 / 13.30-17.30
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 according to Regulation (EC) 1272/2008 (CLP)

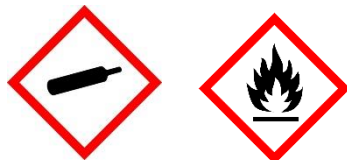
Flam. Gas 1 - H220
Press. Gas (Liq.) – H280

Classification according to Directive EC 67/548/EEC and 1999/45/EC

F+; R12

2.2 Label elements

Dangerous pictogram



GHS04

GHS02

Signal word	Warning - Danger	
Hazard statements (H)	H220:	Extremely flammable gas
	H280:	Contains gas under pressure; may explode if heated
Precautionary statements (P)	P210:	Keep away from heat/sparks/open flames/hot surfaces – No smoking
	P377:	Leaking gas fire: Do not extinguish unless leak can be stopped safely
	P381:	Eliminate all ignition sources if safe to do so
	P403:	Store in a well ventilated place
	P410+P403:	Protect from sunlight. Store in a well ventilated place.

Symbol(s)	F+:	Extremely flammable
List of R-phrases	R12:	Extremely flammable
List of S-phrases	S2:	Keep out of the reach of children
	S9:	Keep container in a well-ventilated place
	S16:	Keep away from sources of ignition - No smoking

2.3 Other hazards

Contact with liquid can cause frostbite and severe damage to the eyes.

3. Composition/information on ingredients

3.1 Substances

Substance name	%	CAS No.	EC No.	REACH No.	Classification Reg. (CE) 1272/2008 (CLP) and Directive 67/548/EEC
Isobutano	> 97%	75-28-5	200-857-2	01-2119485395-27	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. 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.

Note to physician: Do not give adrenaline-ephedrine or similar drugs group.

4.1 Description of first aid measures

Inhalation	Remove patient from exposure to fresh air. Administer oxygen if necessary. Obtain immediate medical attention.
Skin contact	In case of contact with skin, wash immediately with plenty of water. Remove contaminated clothing. If irritation or blistering occurs, call a physician.
Eye contact	Remove contact lenses, if present. Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. If symptoms persist, call a physician.
Ingestion	Unlikely route of exposure. As this product is a gas, refer to the section "Inhalation". Do not induce vomiting without medical advice. Obtain immediate medical attention.

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	Dry powder, water spray, alcohol-resistant foam and CO ₂
No suitable extinguishing media	High water jet.

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.
Hazardous combustion	In case of fire, decomposition products may include the following materials: carbon dioxide and monoxide.

5.3 Advice for firefighters

Specific methods	Coordinate fire measure to the surrounding fire. Exposure to flames and heat can cause the container to rupture. From protected position, cool endangered containers with water spray jet. Do not discharge contaminated water into drains. If possible, stop flow of the product. If possible, use water spray to knock down the fumes. Explosive re-ignition may occur, turn off all the other fire. Move containers from fire area if this can be done without risk.
Protective equipment	Firefighters must use standard protective equipment including SCBA. Avoid contact with eyes and skin. Do breathe the fumes.

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 more information, see section 8 and 13.

7. Handling and storage

7.1 Precautions for safe handling

Technical measures	Use only properly specified equipment that is suitable for this product, its supply pressure and temperature. In case of doubt, refer to supplier's handling instructions. Only experienced and properly instructed persons should handle gases under pressure. Service technician must check regularly your entire gas system to ensure that it is leak-free.
Safe handling	The substance must be handled in accordance with good industrial hygiene and safety procedures. Refer to supplier's / manufacturer's handling instructions. 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. Protect containers from physical damage; do not drag, roll, slide or drop. Do not pierce or burn, even after use. Leave valve protection caps in place until the container is ready for use. Close container valve after each use and when empty, even if still connected to equipment. Do not remove or deface labels provided by the supplier for the identification of the container contents.
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 incompatibility

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. Container valves or caps should be in place.

Incompatible materials

Avoid storage with oxidizing products, acids and, in general, with chemicals.
 Avoid storage with tools or equipment that may cause sparks.

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 data available.

Components	CAS Nr.	TLV-TWA	Control parameters	Font	Year
Isobutane	75-28-5	8 h	800 ppm 1900 mg/m ³	AGCIH	2010

DNEL and DMEL = the substance have no harmful effect on human health.

PNEC = the substance have no harmful effect on the environmental.

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** Evaluate the need for flame resistant workwear.
 EN ISO 14116 Protective clothing - Protection against heat and flame - Limited flame spread materials.
 EN ISO 1149-5 Protective clothing – Electrostatic properties.
 Wear safety shoes while handling containers.
 EN ISO 20345 Personal protective equipment - Safety shoes.
 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.

Prevent spillage or leakage of the product in watercourse or sewers (explosion danger). Avoid air emissions.

For more information, see section 7.

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

a) Appearance	Liquefied gas
Colour	Colourless
b) Odour	Odourless
c) Odour threshold	Odour threshold is subjective and is inadequate to warn of over exposure.
d) pH	n.a.
e) Melting point	- 182,47 °C (experimental result, supporting study)
f) Initial boiling point	- 11,73° C @ 1013 hPa (experimental result, supporting study)
g) Flash point	- 88,6° C
h) Evaporation rate	Not applicable to gas and gas mixtures
i) Flammability (solid, gas)	Not applicable to gas and gas mixtures
j) Upper/lower flammability	12,5 % (V) (experimental result, supporting study) / 1,50 % (V)
k) Vapour pressure	2.200 Pa @ 20° C
l) Vapour density	2,01 (air = 1)
m) Relative density	0,59
n) Solubility (in the water)	54 mg/l
o) Partition coefficient: n-Octanol/water	2,76 log Kow
p) Auto-ignition temperature	287 °C (experimental result, supporting study)
q) Decomposition temperature	Not available data
r) Viscosity	Not available data
s) Explosive properties	Not available data
t) Oxidising properties	Not oxidising according with EU criteria

9.2 Other information

Critical temperature (°C)	135 °C
Vapour pressure	347,97 kPa @ 25 °C
Molecular weight	58,12 g/mol (C4H10)

10. Stability and reactivity**10.1 Reactivity**

Stable under normal handling and storage conditions.

10.2 Chemical stability

Stable under normal handling and storage conditions.

10.3 Possibility of hazardous reactions

May react violently with oxidants.
Can form explosive mixture with air.

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

Air, oxidizing agents.

10.6 Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced.
In case of combustion, toxic compositions, may be formed: carbon monoxide (CO) and carbon dioxide (CO₂).

11. Toxicological information

11.1 Information on toxicological effects

a) Acute toxicity

Inhalation LC50: 658 000 ppm
Exposition time: 4 h
Animal species: Rat

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

e) Germ cell mutagenicity Based on available data the classification criteria are not met.

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 Based on available data the classification criteria are not met.

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

Other information

High concentrations may cause drowsiness, headache and dizziness. If the amount of oxygen in the air drops below 17% may cause unconsciousness, asphyxia and / or CNS depression.

Inhalation at high concentrations of decomposition products may cause respiratory failure (pulmonary edema).

Contact with compressed gas may cause frostbite and serious ocular injury.

12. Ecological information

12.1 Toxicity

Fish CL50: 27,98 mg/l
Exposure time: 96 h
Species: Various
Remarks: QSAR, supporting study

Aquatic invertebrates CL50: 14,22 mg/l
Exposure time: 48 h
Species: Daphnia magna
Remarks: QSAR, supporting study

12.2 Persistence and degradability

The substance will be readily biodegradable and it is not expected to persist in the environment.

12.3 Bioaccumulative potential

The substance are not considered to be persistent in the environment due to its low log Kow (log Kow < 4).

12.4 Mobility in soil

Because of its high volatility, the product is unlikely to cause ground or water.

12.5 Results of PBT and vPvB assessment

This product does not meet the PBT or vPvB criteria.

12.6 Other adverse effects

Ozone Depletion Potential ODP (R-11=1) = 0
Global Warming Potential GWP (CO2=1) = 3

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)

16 05 04* Gases in pressure containers (including halons) containing dangerous substances.

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.

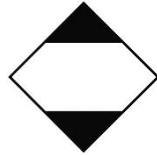
14. Transport information

14.1 UN Number UN 2037

14.2 UN proper shipping name RECEPTACLES, SMALL, CONTAINING GAS (GAS CARTRIDGES)

Hazard labels

ADR/RID, IMDG, IATA/ICAO



Limited Quantity (L.Q.)

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

14.3 Transport hazard class(es)	2
Classification code	5A
14.4 Packing group	n.a.
Packing instruction	P003
14.5 Environmental hazards	No
Additional information	
Tunnel restriction code of total load	E: Passage forbidden through tunnels of category E
Limited quantity (LQ)	1L
Excepted quantity (EQ)	E0

Transport by air (IATA/ICAO)

14.3 Transport hazard class(es)	2
Class/Division	2.1
14.4 Packing group	n.a.
Passengers and cargo flights	203 – Max quantity 1 Kg
Cargo flights only	203 – Max quantity 15 Kg
14.5 Environmental hazards	No
Additional information	
Limited quantity (LQ) – Passengers flights	Y203 (1 Kg)
Excepted quantity (EQ)	E0

Transport by sea (IMDG)

14.3 Transport hazard class(es)	2
Class/Division	2.1
Emergency Schedule (EmS)	F-C, S-V
14.4 Packing group	n.a.
Packing instruction	P203
14.5 Environmental hazards	No
Additional information	
Limited quantity (LQ)	1L
Excepted quantity (EQ)	E0

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) = 3

Additional regulations/legislations

Regulation (EU) No. 517/2014
Directive Seveso 96/82/EC: Not included

15.2 Chemical safety assessment

A Chemical Safety Assessment (CSA) has been made for this product.

16. Other information

This Material Safety Data Sheet has been made according European Directive in force.

Text of hazard (H) and precautionary (P) statements in section 2 and 3

H220: Extremely flammable gas
H280: Contains gas under pressure; may explode if heated
P210: Keep away from heat/sparks/open flames/hot surfaces – No smoking
P377: Leaking gas fire: Do not extinguish unless leak can be stopped safely
P381: Eliminate all ignition sources if safe to do so
P403: Store in a well ventilated place

Text of risk (R) and safety (S) phrases in section 2

R12: Extremely flammable
S2: Keep out of the reach of children
S9: Keep container in a well-ventilated place
S16: Keep away from sources of ignition - No smoking

Text of "Hazard Class and Category Code" in section 2 and 3, according to Regulation (EC) n. 1272/2008 (CLP) and Directive 67/548/EEC

Flam. Gas 1 Flammable gas Category 1
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 4 by Mariel Srl	Version 3	Version 2	Version 1
	Revision date: 05/2019	Date: 11/2015	Date: 05/2015	Date: 03/2011

b) Abbreviations and acronyms

ADR Accord Dangerous Route
CAS Chemical Abstracts Service number
CE / EC European Community
CLP Classification, Labelling, Packaging
CSA Chemical Safety Assessment
DNEL Derived No Effect Level
DMEL Derived Minimum Effect Level
EC50 Effective Concentration 50%

EmS	Emergency Schedule
EWS	European Waste System
GHS	Globally Harmonized 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%
Log Kow	Logarithm Partition coefficient N-octanol /Water
MARPOL	MARitime POLLution (Inquinamento Marittimo)
n.a.	not applicable
n.d.a.	no data available
ODP	Ozone Depletion Potential
OEL	Occupational Exposure Limit
PBT	Persistent, Bioaccumulative, Toxic
PNEC	Predicted No Effect Concentration
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
RID	Rail International Dangerous goods transport
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
VOC	Volatile Organic Compounds
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.

The information contained in this safety data sheet are based on our current knowledge and EU and national laws; they describe the product only with regard to safety requirements. The conditions of the user are beyond our knowledge and control. The product should not be used for purpose other than those specified. It is always the responsibility of the user to take all the necessary measures to comply with the requirements of current legislation. The information contained in this form should not considered as a guarantee of its properties.
