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

1.1. Product identifier

Name of product	Isobutane
	Art-Nr(n).: 2322ff, 0056, 0066, 70232
Name of substance	isobutane
Index No	601-004-00-0
EC No	200-857-2
REACH registration number	01-2119485395-27
CAS No	75-28-5

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

Identified uses

Sector of uses [SU]
SU10 - Formulation [mixing] of preparations and/or re-packaging (excluding alloys)
SU12 - Manufacture of plastics products, including compounding and conversion
SU2a - Mining (without offshore industries)
SU2b - Offshore industries
SU21 - Consumer uses: Private households (= general public = consumers)
SU22 - Professional uses: Public domain (administration, education, entertainment, services, craftsmen)
SU0-2 - Other activity related to manufacture and services.
SU3 - Industrial uses: Uses of substances as such or in preparations at industrial sites
SU8 - Manufacture of bulk, large scale chemicals (including petroleum products)

Product categories [PC]
PC13 - Fuels
PC16 - Heat transfer fluids
PC19 - Intermediates
PC21 - Laboratory chemicals
PC24 - Lubricants, greases, release products
PC29 - Pharmaceuticals
PC3 - Air care products
PC32 - Polymer preparations and compounds
PC34 - Textile dyes, finishing and impregnating products; including bleaches and other processing aids
PC35 - Washing and cleaning products (including solvent based products)
PC39 - Cosmetics, personal care products
PC0 - Other
PC8 - Biocidal products (e.g. Disinfectants, pest control)
PC9a - Coatings and paints, thinners, paint removers
PC9b - Fillers, putties, plasters, modelling clay

Process categories [PROC]
PROC1 - Use in closed process, no likelihood of exposure
PROC2 - Use in closed, continuous process with occasional controlled exposure
PROC3 - Use in closed batch process (synthesis or formulation)
PROC5 - Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)
PROC7 - Industrial spraying
PROC9 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
PROC12 - use of blowing agents in manufacture of foam
PROC16 - Using material as fuel sources, limited exposure to unburned product to be expected
PROC8a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC11 - Non industrial spraying
PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at

dedicated facilities

Environmental release categories [ERC]
ERC1 - Manufacture of substances
ERC7 - Industrial use of substances in closed systems
ERC8a - Wide dispersive indoor use of processing aids in open systems
ERC8d - Wide dispersive outdoor use of processing aids in open systems
ERC2 - Formulation of preparations (mixtures)
ERC3 - Formulation in materials
ERC4 - Industrial use of processing aids in processes and products, not becoming part of articles
ERC5 - Industrial use resulting in inclusion into or onto a matrix
ERC6a - Industrial use resulting in manufacture of another substance (use of intermediates)

Remark
Restricted to professional users.

Recommended intended purpose(s)
Basic substance.
Propellant.
Laboratory reagent.
Refrigerant (R-600a)

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
Siltnamių 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 categories	Hazard	Hazard Statements	Classification procedure

Flam. Gas 1	**H220**
Liquef. Gas	**H280**

Hazard statements for physical hazards

H220	**Extremely flammable gas.**
H280	**Contains gas under pressure; may explode if heated.**

Additional hints
Listed substance (Regulation (EC) No 1272/2008, Annex VI, part 3).

2.2. Label elements

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

GHS02

Signal word
Danger

Hazard statements for physical hazards

H220	**Extremely flammable gas.**
H280	**Contains gas under pressure; may explode if heated.**

Precautionary Statements

Prevention

P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

Response

P377	Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381	In case of leakage, eliminate all ignition sources.

Storage

P403	Store in a well-ventilated place.

2.3. Other hazards
Adverse human health effects and symptoms
Contact with liquid may cause cold burns/frostbite.
Asphyxiant in high concentrations.

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
This substance does not meet the PBT/vPvB criteria of REACH, annex XIII.

!SECTION 3: Composition/ information on ingredients

3.1. Substances
Description
Content: > 95 %

CAS No 75-28-5 **isobutane**
EC No 200-857-2
Index No 601-004-00-0

REACH registration number 01-2119485395-27

3.2. Mixtures
not applicable

!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 treatment 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 artifical 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).
Shortness of breath
Anaesthetic state
Headache
Nausea
Contact with liquid may cause cold burns/frostbite.

Physician's information / possible dangers
Risk of respiratory disorders
In case of strong exposition risk of cardiac rhythm disturbances.

4.3. Indication of any immediate medical attention and special treatment needed
Treatment (Advice to doctor)
Treat symptoms.
Monitor circulation.

SECTION 5: Firefighting measures

5.1. Extinguishing media
Suitable extinguishing media
Dry powder
Carbon dioxide

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.
In the event of fire the following can be released:
Carbon monoxide (CO)
Carbon dioxide (CO2)

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.
Do not extinguish a leaking gas flame unless absolutely necessary. Spontaneous/explosive re-ignition may occur.
Extinguish any other fire.
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.
Keep away sources of ignition.

! **For emergency responders**
Remove persons to safety.
Keep area evacuated and free from ignition sources until any spilled liquid has evaporated. (Ground free from frost).
Personal protection by wearing close-fitting protective clothing and breathing apparatus.
Eliminate all ignition sources if safe to do so.

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.
Take measures against electrostatically charging.
Barrels and installations thoroughly earthing (grounding).
Use antistatic tools.
Treatment only in suitable rooms and systems.
Provide good room ventilation even at ground level (vapours are heavier than air).
Prevent cylinders from falling over.
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 combustible.
Because of risk of explosion avoid vapours getting into cellar, sewage system and holes.
Take precautionary measures against static discharges.
Formation of explosive gas mixtures in air.
Pay attention to general rules of internal fire prevention.
Use explosion-proof equipment / fittings and non-sparking tools.

7.2. Conditions for safe storage, including any incompatibilities

Requirements for storage rooms and vessels

Keep in closed original container.
Ventilate store-rooms thoroughly.
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 spontaneously flammable materials.
Do not store together with combustible liquids or combustible solids.
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).
Keep container tightly closed and store at cool and aired place.
Prevent cylinders from falling over.
Protect of heat.

7.3. Specific end use(s)
! **Recommendation(s) for intended use**
See section 1.2
Exposure scenarios (ES) see annex to this safety data sheet.

!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
75-28-5	Isobutane	REL, 8 hours	1900	800	NIOSH, USA

8.2. Exposure controls
! **Respiratory protection**
Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe.
Keep self contained breathing apparatus readily available for emergency use.
Do not use any filter apparatus.
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
Protective gloves complying with EN 374.
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 complying with EN 14605.

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	Colour	Odour
Gaseous / liquefied under pressure.	colourless	sweetish

Odour threshold
not determined

Important health, safety and environmental information

	Value	Temperature	at	Method	Remark
pH value	not applicable				
Acid number	not applicable				
boiling point	-11,7 °C		1013 hPa		
melting point	-159,6 °C				
Flash point	-83 °C				
Vapourisation rate	not applicable				
Flammable (solid)	not applicable				
Flammability (gas)	inflammable				
Ignition temperature	460 °C				
Self ignition temperature	460 °C				
Lower explosion limit	1,5 Vol-%				
Upper explosion limit	9,4 Vol-%				
Vapour pressure	3020 hPa	20 °C			
Relative density	2,7 kg/m3	0 °C	1013 hPa		
Vapour density	2,07				Air = 1.
Solubility in water	49 mg/l	20 °C			
Solubility/other					soluble in organic solvent
Partition coefficient n-octanol/water (log P O/W)	2,76				
Decomposition temperature	not applicable				
Viscosity dynamic	not applicable				

Oxidising properties
no

Explosive properties
Due to its chemical structure, the product is not classified as explosive.

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
Formation of explosive gas/air mixtures.
Violent reactions with air and oxidising agents.

10.4. Conditions to avoid
Formation of explosive gas/air mixtures.
Heat sources / heat - risk of bursting.
Avoid contact with open flames, glowing metal surfaces, etc..

10.5. Incompatible materials
! **Substances to avoid**
Acetylene
Air, oxidiser.
Nitrogen oxides (NOx)

10.6. Hazardous decomposition products
When handled and stored appropriately, no dangerous decomposition products are known.

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	520400 ppm (120 min)	mouse		
Skin irritation	Study technically not feasible.			

	Value/Validation	Species	Method	Remark
Eye irritation	Study technically not feasible.			
Skin sensitization	Study technically not feasible.			
Sensitization respiratory system	not determined			

Subacute Toxicity - Carcinogenicity

	Value	Species	Method	Validation
Subacute Toxicity	NOAE.C 4000 ppm (28 d) Sub-acute inhalation toxicity 6 h/d, 7 d/w.	rat (male / female)	OECD 422.	No effects of toxicological significance.
Subchronic Toxicity	NOAEC 9000 ppm (42 d) Inhalation 6 h/d, 5 d/w	Rat (male / female)	OECD TG 422	No effects of toxicological significance.
Mutagenicity	0,5 - 8 % (24 - 44 h) Gene mutation	human lymphocytes	OECD 473	No experimental information on genotoxicity in vitro available.
Reproduction-Toxicity	NOAEC 3000 ppm Inhalation. 6 h/d, 7 d/w	Rat (male / female)	OECD TG 422	No indications of toxic effects were observed in reproduction studies in animals.
Carcinogenicity				Study scientifically not justified.

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 for gases and gas mixtures

Toxicity test (Additional information)
No experimental indication of genotoxicity in vitro (Ames-test negative).
No indication of cancerogenic effects at humans available.

Experiences made from practice
May cause frostbite.
Gases have a suffocating effect.
Inhalation causes narcotic effect/intoxication.

!SECTION 12: Ecological information

12.1. Toxicity

Ecotoxicological effects

	Value	Species	Method	Validation
Fish	LC50 27,98 - 147,54 mg/l (96 h)	Fish	QSAR	
Daphnia	LC50 16,33 mg/l (48 h)	Daphnia	QSAR	
Algae	EC50 8,57 mg/l (96 h)	Algae	QSAR	

12.2. Persistence and degradability

	Elimination rate	Method of analysis	Method	Validation
Physico-chemical degradability	At normal temperature very highly volatile or gaseous product that can be released to atmosphere. Elimination test cannot be employed.			
Biological degradability	100 % (385,5 h)		OECD	readily degradable

12.3. Bioaccumulative potential

Bioaccumulation improbable.
Because of the n-octanol/water distribution coefficient (log K o/w) accumulation in organisms is not expected.

12.4. Mobility in soil

Adsorption in the soil is not likely.
Because of its high volatility, it is unlikely that the product soil, water caused.

12.5. Results of PBT and vPvB assessment

This substance does not meet the PBT/vPvB criteria of REACH, annex XIII.

12.6. Other adverse effects

GWP: 3

General regulation
Avoid release to the environment.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste code No.	**Name of waste**
16 05 04*	gases in pressure containers (including halons) containing hazardous substances

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.

Recommendations for packaging
Transportable pressure equipment (empty, residual pressure): Return to supplier / manufacturer.

!SECTION 14: Transport information

	ADR/RID	IMDG	IATA-DGR
14.1. UN number	1969	1969	1969
14.2. UN proper shipping name	ISOBUTANE	ISOBUTANE	Isobutane
14.3. Transport hazard class(es)	2.1	2.1	2.1
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) 2.1
tunnel restriction code B/D
Classification code 2F

Marine transport IMDG
Ems: F-D, S-U

!SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture
Other regulations (EU)
Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), Annex XVII No 40.
Directive 2012/18/EU on the control of major-accident hazards involving dangerous substances.

VOC standard
VOC content 100 % 20 °C 3020 hPa

15.2. Chemical Safety Assessment
For this substance a chemical safety assessment has been carried out.
Exposure scenarios (ES) see annex to this safety data sheet.

SECTION 16: Other information

Recommended uses and restrictions
National and local regulations concerning chemicals shall be observed.

Further information
All declarations of safety-data-sheet refer to pure substance.
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: 8.1

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.

List of descriptor used for gases	IUCLID 5		ECHA uses descriptors				
List of uses for gas	**Main use categories**	**Specifications for industrial and professional uses**	**Proc**	**PC**	**SU**	**NACE**	**ERC**
Formulation of mixtures with gas in pressure receptacles	Industrial	Close system	1,3	n.a.	10	-	ERC2
Using gas alone or in mixtures for calibration of analysis equipment	Industrial	Close system	1,3	21	0 - 2a, 2b	M74.9	ERC8D
Transfilling gas or liquid	Industrial	Close system	9	n.a.	10	-	ERC2
Using gas as a fuel	Consumers	Non-dispersive use	16	13	3, 21, 22	-	open
Use gas as feedstock in chemical process	Industrial	Close system	1	19	3,8		ERC6A, ERC1
Use of gas as to refill refrigeration equipment Refrigerant gas	Professional	Close system	8	16	3, 22	-	ERC7
Aerosol Propellant use	Industrial	Wide dispersive use	2,5,7,9b 11	0,3,8,9a, 9b, 24,34,35, 29,39	3,10,21,22		ERC2-8A
Use gas in mixtures as foaming agents in personal care products	Industrial	Close system	12	39	21		open
Using of blowing agents in manufacture of plastic foam	Industrial	Close system	12	32	12	22.2	ERC3
Use as intermediate (transport, on-site isolated)	Industrial	Close system	1	19	3		ERC6A

Legend

IUCLID International Uniform Chemical Information Database
PC Preparation Category
SU Sector of use category
NACE Nomenclature General of Economic Activities within European Communities
ERC Environmental release category
ECHA European Chemicals Agency
N.A. Not Applicable

PROC 1 Use in closed process, no likelihood of exposure
PROC 2 Use in close, continuous process with occasional controlled exposure (e.g. sampling)
PROC 3 Use in batch and other process (synthesis or formulation)
PROC 5 Mixing or blending in batch processes for formulation of preparations and articles (multistage)
PROC 7 Industrial spraying
PROC 8 Transfer of a substance or preparation (charging/discharging) from / to vessels / large containers at non- dedicated facilities
PROC 9 Transfer of a substance or preparation into small containers (dedicated filling line, including weighing)
PROC 11 Non-industrial spraying
PROC 12 Use of blowing agents in manufacture of foam
PROC 16 Using materials as fuel sources, limited exposure to unburned product to be expected. Industrial or not industrial setting

Legend (continue)

PC 0 Other products
PC 3 Air care products
PC 8 Biocidal products (eg, disinfectants, pest control)
PC 9a Coatings and paints, thinners, paint removers
PC 9b Fillers, Putties
PC 13 Fuels
PC 16 Heat transfer fluids
PC 19 Intermediate
PC 21 Laboratory Chemicals
PC 24 Lubricants, Greases and Release Products
PC 29 Pharmaceuticals
PC 32 Polymer Preparations and Compounds
PC 34 Textile dyes, finishing and impregnating products, including bleaches and other processing aids
PC 35 Washing and Cleaning (including solvent based products)
PC 39 Cosmetic, personal care products

SU 0 Others
SU 2nd Mining (without offshore industries)
SU 2b Offshore industries
SU 3 Industrial use: end uses of substances as such or preparations at industrial sites
SU 8 Manufacture of bulk ,large scale chemicals (including petroleum products)
SU 10 Formulation: Formulation (mixing) of preparations and/or re-packaging
SU 12 Manufacture of plastics products, including compounding and conversion
SU 21 Consumer uses: private households (=general public=consumer)
SU 22 Professional Uses: Public domain (administration, education, entertainment, services, craftsmen)

ERC 1 Manufacture of substances
ERC 2 Formulation of preparations
ERC 3 Formulation in materials
ERC 6a Industrial use resulting in manufacture of another substance (use of intermediates)
ERC 7 Industrial use of substances in closed systems
ERC 8a Wide dispersive indoor use of processing aids in open systems