butane

Safety Data Sheet

according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878
Reference number: EIGA014
Issue date: 16/01/2013 Revision date: 08/07/2025 Supersedes version of: 20/11/2024 Version: 1.7

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

1.1. Product identifier

Product form	:	Substance
Name	:	butane
EC Index-No.	:	601-004-00-0
EC-No.	:	203-448-7
CAS-No.	:	106-97-8
REACH registration No.	:	01-2119474691-32
Product code	:	000010021793
Formula	:	C4H10
Synonyms	:	butane-n; / n-butane; / r600; / 1-Butane
Other means of identification	:	Butane (n-Butane) 2.5; Refrigerant R-600; LPG; Liquified Petroleum Gas; Normale-Butan; Diathyl; Buthylhydrid; n-Methylethylmethan

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

1.2.1. Relevant identified uses

Relevant identified uses	:	Industrial and professional uses. Perform risk assessment prior to use. Test gas/Calibration gas. Chemical reaction / Synthesis. Use as a fuel. Laboratory use.
Use of the substance/mixture	:	Aerosol propellant Refrigerant Formulation of mixtures with gas in pressure receptacles. Formulation of mixtures with gas in pressure receptacles, Transfilling gas or liquid. Fuels

Title	Life cycle stage	Use descriptors
(ES Ref.: ES0110021793) (ES Ref.: ES0210021793) (ES Ref.: ES0310021793)	Industrial, Professional, Consumer	SU24, PC0, PC13, PC16, PC21, PROC1, PROC8a, PROC8b, PROC11, PROC15, PROC16, ERC2, ERC8a, ERC8b, ERC8e, ERC9a, ERC9b

Full text of use descriptors: see section 16

1.2.2. Uses advised against

Uses advised against	:	Consumer use. Uses other than those listed above are not supported, contact your supplier for more information on other uses.

1.3. Details of the supplier of the safety data sheet

Linde Gas GmbH
Carl-von-Linde-Platz 1
A-4651 Stadl-Paura
Austria
T +43 50 4273
office@at.linde-gas.com

1.4. Emergency telephone number

Emergency number : UMCO/NCEC: +44 1865 407333 (English); +49 89 220 61012 (German)

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

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

Physical hazards	Flammable gases, Category 1A	H220
	Gases under pressure : Liquefied gas	H280

Full text of H- and EUH-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) :

GHS02 GHS04

Signal word (CLP) : Danger

Hazard statements (CLP) : H220 - Extremely flammable gas.
H280 - Contains gas under pressure; may explode if heated.

Precautionary statements (CLP)

- 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

Other hazards : Asphyxiant in high concentrations. These high concentrations are within the flammability range. Contact with liquid may cause cold burns/frostbite. The substance/mixture has no endocrine disrupting properties.

SECTION 3: Composition/information on ingredients

3.1. Substances

Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP] ATE, EUH-statements, M-Factors
butane	CAS-No.: 106-97-8 EC-No.: 203-448-7 EC Index-No.: 601-004-00-0 REACH-no: 01-2119474691-32	100	Flam. Gas 1A, H220 Press. Gas (Liq.), H280

Full text of H- and EUH-statements: see section 16

Contains no other components or impurities which will influence the classification of the product.

3.2. Mixtures

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures after inhalation : Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Perform cardiopulmonary resuscitation if breathing stopped.

First-aid measures after skin contact : In case of frostbite spray with water for at least 15 minutes. Apply a sterile dressing. Obtain medical assistance.

First-aid measures after eye contact : Immediately flush eyes thoroughly with water for at least 15 minutes.

First-aid measures after ingestion : Ingestion is not considered a potential route of exposure.

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

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.
See section 11.

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

None.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : Dry powder. Carbon dioxide. Shutting off the source of the gas is the preferred method of control. Water spray or fog. Be aware of the risk of formation of static electricity with the use of CO_2 extinguishers. Do not use them in places where a flammable atmosphere may be present.

Unsuitable extinguishing media : Do not use water jet to extinguish.

5.2. Special hazards arising from the substance or mixture

Reactivity in case of fire : No reactivity hazard other than the effects described in sub-sections below.

Specific hazards : Exposure to fire may cause containers to rupture/explode.

Hazardous combustion products : Carbon monoxide.

5.3. Advice for firefighters

Specific methods : Do not extinguish a leaking gas flame unless absolutely necessary. Spontaneous/explosive re-ignition may occur. Extinguish any other fire.
Use fire control measures appropriate for the surrounding fire. Exposure to fire and heat radiation may cause gas receptacles to rupture. Cool endangered receptacles with water spray jet from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems.
If possible, stop flow of product.
Use water spray or fog to knock down fire fumes if possible.
Move containers away from the fire area if this can be done without risk.

Special protective equipment for fire fighters : In confined space use self-contained breathing apparatus.
Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters.
Standard EN 469 - Protective clothing for firefighters. Standard - EN 659: Protective gloves for firefighters. EN 15090 Footwear for firefighters. EN 443 Helmets for fire fighting in buildings and other structures.
Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

Emergency procedures : Act in accordance with local emergency plan. Try to stop release. Evacuate area. Eliminate ignition sources. Ensure adequate air ventilation. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous. Stay upwind. See section 8 of the SDS for more information on personal protective equipment.

6.1.2. For emergency responders

Emergency procedures : Monitor concentration of released product. Consider the risk of potentially explosive atmospheres. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. See section 5.3 of the SDS for more information.

6.2. Environmental precautions

Try to stop release.

6.3. Methods and material for containment and cleaning up

Methods and material for containment and cleaning up : Ventilate area.

6.4. Reference to other sections

See also sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Safe use of the product : Assess the risk of potentially explosive atmospheres and the need for explosion-proof equipment.
Purge air from system before introducing gas.
Take precautionary measures against static discharge.
Keep away from ignition sources (including static discharges).
Consider the use of only non-sparking tools.
Ensure equipment is adequately earthed.
The product must be handled in accordance with good industrial hygiene and safety procedures.
Only experienced and properly instructed persons should handle gases under pressure.
Consider pressure relief device(s) in gas installations.
Ensure the complete gas system was (or is regularily) checked for leaks before use.
Do not smoke while handling product.
Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt.
Avoid suck back of water, acid and alkalis.
Do not breathe gas.
Avoid release of product into work area.

Safe handling of the gas receptacle : Refer to supplier's container handling instructions.
Do not allow backfeed into the container.
Protect containers from physical damage; do not drag, roll, slide or drop.
When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders.
Leave valve protection caps, when provided, in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use.
If user experiences any difficulty operating valve discontinue use and contact supplier.
Never attempt to repair or modify container valves or safety relief devices.
Damaged valves should be reported immediately to the supplier.
Keep container valve outlets clean and free from contaminants particularly oil and water.
Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment.
Close container valve after each use and when empty, even if still connected to equipment.
Never attempt to transfer gases from one cylinder/container to another.
Never use direct flame or electrical heating devices to raise the pressure of a container.
Do not remove or deface labels provided by the supplier for the identification of the content of the container.
Suck back of water into the container must be prevented.
Open valve slowly to avoid pressure shock.

7.2. Conditions for safe storage, including any incompatibilities

Conditions for safe storage, including any incompatibilities : Segregate from oxidant gases and other oxidants in store.
All electrical equipment in the storage areas should be compatible with the risk of a potentially explosive atmosphere.
Observe all regulations and local requirements regarding storage of containers.
Containers should not be stored in conditions likely to encourage corrosion.
Container valve guards or caps, when provided, should be in place.
Containers should be stored in the vertical position and properly secured to prevent them from falling over.
Stored containers should be periodically checked for general condition and leakage.
Keep container below 50°C in a well ventilated place.
Store containers in location free from fire risk and away from sources of heat and ignition.
Keep away from combustible materials.

7.3. Specific end use(s)

None.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

8.1.1 National occupational exposure and biological limit values

butane (106-97-8)	
Austria - Occupational Exposure Limits	
Local name	Butan (beide Isomeren): n-Butan (R 600)
MAK (OEL TWA)	1900 mg/m³
	800 ppm
MAK (OEL STEL)	3800 mg/m³ (3x 60(Mow) min)
	1600 ppm (3x 60(Mow) min)
Regulatory reference	BGBl. II Nr. 156/2021

8.1.2. Recommended monitoring procedures

No additional information available

8.1.3. Air contaminants formed

No additional information available

8.1.4. DNEL and PNEC

butane (106-97-8)	
DNEL/DMEL (additional information)	
Additional information	None established.
PNEC (additional information)	
Additional information	None established.

8.1.5. Control banding

No additional information available

8.2. Exposure controls

Appropriate engineering controls

Appropriate engineering controls:
Provide adequate general and local exhaust ventilation. Product to be handled in a closed system. Gas detectors should be used when flammable gases/vapours may be released. Consider the use of a work permit system e.g. for maintenance activities. Systems under pressure should be regularly checked for leakages. Ensure exposure is below occupational exposure limits (where available).

Personal protection equipment

Personal protective equipment:
A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk. The following recommendations should be considered: PPE compliant to the recommended EN/ISO standards should be selected.

Eye and face protection

Eye protection:
Wear goggles when transfilling or breaking transfer connections. Standard EN 166 - Personal eye-protection - specifications

Skin protection

Hand protection:
Wear working gloves when handling gas containers. Standard EN 388 - Protective gloves against mechanical risks, performance level 1 or higher. Recommended types include wrist gloves from leather or synthetic material with equivalent performance, fabric gloves, fabric gloves with leather palms. Wear cold insulating gloves when transfilling or breaking transfer connections. Standard EN 511 - Cold insulating gloves, performance level 1 or higher. Recommended types include insulated gauntlets or gloves specifically selected to prevent liquid penetration and ingress of cryogenic liquids and to provide mechanical resistance. Hydrogenated Nitrile -Butadiene rubber (HNBR)

Respiratory protection

Respiratory protection:
Recommended: Filter AX (brown). Self contained breathing apparatus is recommended, where unknown exposure may be expected, e.g. during maintenance activities on installation systems. Gas filters may be used if all surrounding conditions e.g. type and concentration of the contaminant(s) and duration of use are known. Use gas filters with full face mask, where exposure limits may be exceeded for a short-term period, e.g. connecting or disconnecting containers. Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask. Gas filters do not protect against oxygen deficiency. Standard EN 14387 - Gas filter(s), combined filter(s) and standard EN136, full face masks .

Thermal hazards

Thermal hazard protection:
None in addition to the above sections.

Environmental exposure controls

Environmental exposure controls:
Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment.
Other information:
Consider the use of flame resistant anti-static safety clothing. Standard EN ISO 14116 - Limited flame spread materials. Standard EN 1149-5 - Protective clothing: Electrostatic properties. Wear safety shoes while handling containers. Standard EN ISO 20345 - Personal protective equipment - Safety footwear.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance

Physical state	:	Gas
Colour	:	Colourless.
Form	:	Liquefied gas
Odour	:	Stenchant often added. Sweetish. Poor warning properties at low concentrations.
Odour threshold	:	Odour threshold is subjective and inadequate to warn of overexposure.
Melting point	:	-138 °C
Freezing point	:	Not applicable
Boiling point	:	-0.5 °C
Flammability	:	Extremely flammable gas.
Oxidising properties	:	No oxidising properties.
Explosive limits	:	Not known.
Lower explosion limit	:	1.4 vol %
Upper explosion limit	:	9.4 vol %
Flash point	:	Not applicable for gases and gas mixtures.
Auto-ignition temperature	:	365 °C
Decomposition temperature	:	Not applicable.
pH	:	Not applicable for gases and gas mixtures.
Viscosity, kinematic	:	No reliable data available.
Viscosity, dynamic	:	0.007 mPa·s
Solubility in water	:	88 mg/l
Partition coefficient n-octanol/water (Log Kow)	:	2.89
Partition coefficient n-octanol/water (Log Pow)	:	Not applicable for gas mixtures.
Vapour pressure	:	2 bar(a)
Vapour pressure at 50°C	:	5 bar(a)
Critical pressure	:	3796 kPa
Density	:	0.423 g/cm³
Relative density	:	0.6
Relative vapour density at 20°C	:	Not applicable.
Relative gas density	:	2.1
Particle characteristics	:	Not applicable Not applicable for gases and gas mixtures. Nanoforms are not relevant for gases and gas mixtures.

9.2. Other information

9.2.1. Information with regard to physical hazard classes

Tci	:	3.6 %
Critical temperature	:	152 °C

9.2.2. Other safety characteristics

Molecular mass	:	58 g/mol
Gas group	:	Press. Gas (Liq.)
Additional information	:	Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

SECTION 10: Stability and reactivity

10.1. Reactivity

No reactivity hazard other than the effects described in sub-sections below.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

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

10.4. Conditions to avoid

Keep away from heat/sparks/open flames/hot surfaces. – No smoking. Avoid moisture in installation systems.

10.5. Incompatible materials

Air, Oxidisers. For additional information on compatibility refer to ISO 11114.

10.6. Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11: Toxicological information

11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008

Acute toxicity : Toxicological effects not expected by inhalation from this product if occupational exposure limit values are not exceeded.
Acute toxicity (oral) : Not classified
Acute toxicity (dermal) : Not classified
Acute toxicity (inhalation) : Not classified
Skin corrosion/irritation : No known effects from this product.
pH: Not applicable for gases and gas mixtures.
Serious eye damage/irritation : No known effects from this product.
pH: Not applicable for gases and gas mixtures.
Respiratory or skin sensitisation : No known effects from this product.
Germ cell mutagenicity : No known effects from this product.
Carcinogenicity : No known effects from this product.
Reproductive toxicity : Not classified
Toxic for reproduction : Fertility : No known effects from this product.
Toxic for reproduction : unborn child : No known effects from this product.
STOT-single exposure : No known effects from this product.
STOT-repeated exposure : No known effects from this product.
Aspiration hazard : Not applicable for gases and gas mixtures.

butane (106-97-8)	
Viscosity, kinematic	No reliable data available.
Hydrocarbon	Yes

11.2. Information on other hazards

11.2.1. Endocrine disrupting properties

No additional information available

11.2.2. Other information

Other information : The substance/mixture has no endocrine disrupting properties.

SECTION 12: Ecological information

12.1. Toxicity

Assessment : Classification criteria are not met.
Hazardous to the aquatic environment, short–term (acute) : Not classified
Hazardous to the aquatic environment, long–term (chronic) : Not classified
Not rapidly degradable

butane (106-97-8)	
LC50 96 h - Fish [mg/l]	24.1 mg/l
EC50 48h - Daphnia magna [mg/l]	14.2 mg/l
EC50 72h - Algae [mg/l]	7.7 mg/l

12.2. Persistence and degradability

butane (106-97-8)	
Assessment	The substance is readily biodegradable. Unlikely to persist.

12.3. Bioaccumulative potential

butane (106-97-8)	
Partition coefficient n-octanol/water (Log Pow)	Not applicable for gas mixtures.
Partition coefficient n-octanol/water (Log Kow)	2.89

12.4. Mobility in soil

butane (106-97-8)	
Assessment	Because of its high volatility, the product is unlikely to cause ground or water pollution. Partition into soil is unlikely.

12.5. Results of PBT and vPvB assessment

Assessment : Not classified as PBT or vPvB.

12.6. Endocrine disrupting properties

Other adverse effects : No known effects from this product.
Assessment : The substance/mixture has no endocrine disrupting properties.

12.7. Other adverse effects

Other adverse effects : No known effects from this product.

Effect on the ozone layer : No effect on the ozone layer.
Global warming potential [CO2=1] : 4
Effect on global warming : When discharged in large quantities may contribute to the greenhouse effect. Contains greenhouse gas(es).

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste treatment methods : Contact supplier if guidance is required. Do not discharge into areas where there is a risk of forming an explosive mixture with air. Waste gas should be flared through a suitable burner with flash back arrestor. Ensure that the emission levels from local regulations or operating permits are not exceeded. Refer to the EIGA code of practice Doc.30 "Disposal of Gases", downloadable at http://www.eiga.eu for more guidance on suitable disposal methods. Do not discharge into any place where its accumulation could be dangerous. Return unused product in original container to supplier.

List of hazardous waste codes (from Commission Decision 2000/532/EC as amended) : 16 05 04 *: Gases in pressure containers (including halons) containing hazardous substances.

13.2. Additional information

External treatment and disposal of waste should comply with applicable local and/or national regulations.

SECTION 14: Transport information

In accordance with ADR / IMDG / IATA / ADN / RID

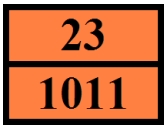
ADR	IMDG	IATA	ADN	RID
14.1. UN number or ID number				
UN 1011	UN 1011	UN 1011	UN 1011	UN 1011
14.2. UN proper shipping name				
BUTANE	BUTANE	Butane	BUTANE	BUTANE
Transport document description				
UN 1011 BUTANE, 2.1, (B/D)	UN 1011 BUTANE, 2.1	UN 1011 Butane, 2.1	UN 1011 BUTANE, 2.1	UN 1011 BUTANE, 2.1
14.3. Transport hazard class(es)				
2.1	2.1	2.1	2.1	2.1
				
14.4. Packing group				
Not applicable	Not applicable	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	Dangerous for the environment: No	Dangerous for the environment: No
No supplementary information available				

14.6. Special precautions for user

Special transport precautions : 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, Before transporting product containers: - Ensure there is adequate ventilation, - Ensure that containers are firmly secured, - Ensure valve is closed and not leaking, - Ensure valve outlet cap nut or plug (where provided) is correctly fitted, - Ensure valve protection device (where provided) is correctly fitted.

Overland transport

Classification code (ADR) : 2F
Special provisions (ADR) : 392, 652, 657, 662, 674
Limited quantities (ADR) : 0
Excepted quantities (ADR) : E0
Packing instructions (ADR) : P200
Mixed packing provisions (ADR) : MP9
Portable tank and bulk container instructions (ADR) : (M), T50
Tank code (ADR) : PxBN(M)
Tank special provisions (ADR) : TA4, TT9, TT11
Vehicle for tank carriage : FL
Transport category (ADR) : 2
Special provisions for carriage - Loading, unloading and handling (ADR) : CV9, CV10, CV36
Special provisions for carriage - Operation (ADR) : S2, S20
Hazard identification number (Kemler No.) : 23
Orange plates :



Tunnel restriction code (ADR) : B/D

Transport by sea

Limited quantities (IMDG)	:	0
Excepted quantities (IMDG)	:	E0
Packing instructions (IMDG)	:	P200
Tank instructions (IMDG)	:	T50
EmS-No. (Fire)	:	F-D
EmS-No. (Spillage)	:	S-U
Stowage category (IMDG)	:	E
Stowage and handling (IMDG)	:	SW2
Properties and observations (IMDG)	:	Flammable hydrocarbon gas. Explosive limits: 1.8% to 8.4%. Heavier than air (2.11).

Air transport

PCA Excepted quantities (IATA)	:	E0
PCA Limited quantities (IATA)	:	FORBIDDEN
PCA limited quantity max net quantity (IATA)	:	FORBIDDEN
PCA packing instructions (IATA)	:	FORBIDDEN
PCA max net quantity (IATA)	:	FORBIDDEN
CAO packing instructions (IATA)	:	200
CAO max net quantity (IATA)	:	150kg
Special provisions (IATA)	:	A1
ERG code (IATA)	:	10L

Inland waterway transport

Classification code (ADN)	:	2F
Special provisions (ADN)	:	392, 657, 662, 674
Limited quantities (ADN)	:	0
Excepted quantities (ADN)	:	E0
Carriage permitted (ADN)	:	T
Equipment required (ADN)	:	PP, EX, A
Ventilation (ADN)	:	VE01
Number of blue cones/lights (ADN)	:	1

Rail transport

Classification code (RID)	:	2F
Special provisions (RID)	:	392, 652, 657, 662, 674
Limited quantities (RID)	:	0
Excepted quantities (RID)	:	E0
Packing instructions (RID)	:	P200
Mixed packing provisions (RID)	:	MP9
Portable tank and bulk container instructions (RID)	:	T50(M)
Tank codes for RID tanks (RID)	:	PxBN(M)
Special provisions for RID tanks (RID)	:	TU38, TE22, TA4, TT9, TM6
Transport category (RID)	:	2
Special provisions for carriage - Loading, unloading and handling (RID)	:	CW9, CW10, CW36
Colis express (express parcels) (RID)	:	CE3
Hazard identification number (RID)	:	23

14.7. Maritime transport in bulk according to IMO instruments

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

REACH Annex XVII (Restriction List)

EU restriction list (REACH Annex XVII)		
Reference code	**Applicable on**	**Entry title or description**
40.	butane	Substances classified as flammable gases category 1 or 2, flammable liquids categories 1, 2 or 3, flammable solids category 1 or 2, substances and mixtures which, in contact with water, emit flammable gases, category 1, 2 or 3, pyrophoric liquids category 1 or pyrophoric solids category 1, regardless of whether they appear in Part 3 of Annex VI to Regulation (EC) No 1272/2008 or not.

REACH Annex XIV (Authorisation List)

Not listed on REACH Annex XIV (Authorisation List)

REACH Candidate List (SVHC)

Contains no substance(s) listed on the REACH Candidate List

PIC Regulation (Prior Informed Consent)

Not listed on the PIC list (Regulation EU 649/2012)

POP Regulation (Persistent Organic Pollutants)

Not listed on the POP list (Regulation EU 2019/1021)

Ozone Regulation (1005/2009)

Not listed on the Ozone Depletion list (Regulation EU 2024/590)

VOC Directive (2004/42)

Restrictions on use : None.

Seveso Directive (Disaster Risk Reduction)

Seveso Directive : 2012/18/EU (Seveso III) : Listed.

Seveso III Part II (Named dangerous substances)	Qualifying quantity (tonnes)	
	Lower-tier	**Upper-tier**
Liquefied flammable gases, Category 1 or 2 (including LPG) and natural gas	50	200

Explosives Precursors Regulation (EU 2019/1148)

Contains no substance(s) listed on the Explosives Precursors list (Regulation EU 2019/1148 on the marketing and use of explosives precursors)

Drug Precursors Regulation (EC 273/2004)

Contains no substance(s) listed on the Drug Precursors list (Regulation EC 273/2004 on the manufacture and the placing on market of certain substances used in the illicit manufacture of narcotic drugs and psychotropic substances)

15.1.2. National regulations

Ensure all national/local regulations are observed.
Safety data sheet in accordance with commission regulation (EU) No 2020/878.
Council Directive 89/391/EEC on the introduction of measures to encourage improvements in the safety and health of workers at work
Directive 2016/425/EEC on personal protective equipment
Directive 2014/34/EU on equipment and protective systems intended for use in potentially explosive atmospheres (ATEX)
Only products that comply with the food regulations (EC) No. 1333/2008 and (EU) No. 231/2012 and are labelled as such may be used as food additives.
This Safety Data Sheet has been produced to comply with Regulation (EU) 2015/830.

15.2. Chemical safety assessment

A CSA has been carried out.

SECTION 16: Other information

Indication of changes:
Safety data sheet in accordance with commission regulation (EU) No 2020/878.

Abbreviations and acronyms:	
ADN	European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways
ADR	ADR - Agreement concerning the International Carriage of Dangerous Goods by Road
ATE	ATE - Acute Toxicity Estimate
BLV	Biological limit value
BOD	Biochemical oxygen demand (BOD)
CAO	Cargo Aircraft only / Cargo Aircraft only
CAS-No.	Chemical Abstract Service number
CLP	CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008
COD	Chemical oxygen demand (COD)
CSA	CSA - Chemical Safety Assessment
DMEL	Derived Minimal Effect level
DNEL	Derived-No Effect Level
EC50	Median effective concentration
EC	European Inventory of Existing Commercial Chemical Substances
ED	Endocrine disruptor
EINECS	EINECS - European Inventory of Existing Commercial Chemical Substances
EN	European Standard
IARC	International Agency for Research on Cancer
IATA	International Air Transport Association
IMDG	International Maritime Dangerous Goods
IOELV	Indicative Occupational Exposure Limit Value
LC50	Median lethal concentration
LD50	Median lethal dose
LOAEL	Lowest Observed Adverse Effect Level
NOAEC	No-Observed Adverse Effect Concentration
NOAEL	No-Observed Adverse Effect Level
NOEC	No-Observed Effect Concentration
N.O.S.	Not Otherwise Specified
OECD	Organisation for Economic Co-operation and Development
OEL	Occupational Exposure Limit
PBT	Persistent Bioaccumulative Toxic
PCA	Passenger and Cargo Aircraft / Passenger and Cargo Aircraft
PNEC	Predicted No-Effect Concentration
PPE	PPE - Personal Protection Equipment
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (EC) No 1907/2006
RID	Regulations concerning the International Carriage of Dangerous Goods by Rail

Abbreviations and acronyms:	
RMM	RMM - Risk Management Measures
STP	Sewage treatment plant
ThOD	Theoretical oxygen demand (ThOD)
TLM	Median Tolerance Limit
TRGS	Technical Rules for Hazardous Substances
STOT-RE	Specific Target Organ Toxicity-Repeated Exposure
STOT-SE	Specific Target Organ Toxicity-Single Exposure
UFI	Unique Formula Identifier
UN	UN - United Nations
VOC	Volatile Organic Compounds
vPvB	Very Persistent and Very Bioaccumulative
WGK	Water Hazard Class

Training advice : Ensure operators understand the flammability hazard.
Other information : Classification in accordance with the procedures and calculation methods of Regulation (EC) 1272/2008 (CLP). Key literature references and sources of data are maintained in EIGA doc 169 : 'Classification and Labelling Guide', downloadable at http://www.Eiga.eu .

Full text of H- and EUH-statements:	
Flam. Gas 1A	Flammable gases, Category 1A
Press. Gas (Liq.)	Gases under pressure : Liquefied gas
H220	Extremely flammable gas.
H280	Contains gas under pressure; may explode if heated.

Full text of use descriptors	
ERC2	Formulation into mixture
ERC8a	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)
ERC8b	Widespread use of reactive processing aid (no inclusion into or onto article, indoor)
ERC8e	Widespread use of reactive processing aid (no inclusion into or onto article, outdoor)
ERC9a	Widespread use of functional fluid (indoor)
ERC9b	Widespread use of functional fluid (outdoor)
PC0	Other
PC13	Fuels
PC16	Heat Transfer Fluids
PC21	Laboratory chemicals
PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC11	Non industrial spraying
PROC15	Use as laboratory reagent
PROC16	Use of fuels
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Full text of use descriptors	
SU24	Scientific research and development

The classification complies with : ATP 12
DISCLAIMER OF LIABILITY : Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out.
Details given in this document are believed to be correct at the time of going to press.
Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted.

Safety Data Sheet (SDS), EU AT

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.

Annex to the safety data sheet

This Annex documents the Exposure Scenarios (ESs) related to the identified uses of the registered substance. The ESs detail protective measures for workers and the environment in addition to those described in sections 7, 8, 11, 12 and 13 of the SDS that are required to ensure that the potential exposure to workers and the environment remains within acceptable levels for each of the identified uses.

Table of contents of the Annex

1. ES0110021793: Industrial uses, closed contained conditions

1.1. Title section

Industrial uses, closed contained conditions	
ES Ref.: ES0110021793	

Environment	Use descriptors
CS0110021793	PC0, ERC2, ERC8a

Worker	Use descriptors
CS0210021793	PROC1, PROC8b, PROC11

1.2. Conditions of use affecting exposure

1.2.1. Control of environmental exposure: PC0, ERC2, ERC8a

PC0	Other
ERC2	Formulation into mixture
ERC8a	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)

Product (article) characteristics	
Physical form of product	Gas
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently)

Amount used, frequency and duration of use (or from service life)	
Annual amount per site	The actual tonnage handled per site is not considered to influence the immissions as such for this scenario as there is practically no release
Emission Days (days/year)	260 days/yr Continuous release
Emission Days (days/year)	260 days/yr Batch process

Technical and organisational conditions and measures	
Technical and organisational measures	Handle substance within a closed system
Air	98 % Air - minimum efficiency of
Soil	Not relevant
Water	Not relevant
Remarks	Not relevant

Conditions and measures related to sewage treatment plant	
Wastewater emission controls are not applicable as there is no direct release to wastewater	

Conditions and measures related to treatment of waste (including article waste)	
See section 13 of the SDS	External treatment and disposal of waste should comply with applicable local and/or national regulations
See section 13 of the SDS	External recovery and recycling of waste should comply with applicable local and/or national regulations

Other conditions affecting environmental exposure	
Not relevant	

Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply
Ensure operatives are trained to minimise exposures

1.2.2. Control of worker exposure: PROC1, PROC8b, PROC11

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC11	Non industrial spraying

Product (article) characteristics	
Physical form of product	Gas
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently)

Amount used (or contained in articles), frequency and duration of use/exposure	
Not relevant	
Use frequency Covers daily exposures up to 8 hours	5 days/week

Technical and organisational conditions and measures	
Provide a basic standard of general ventilation (1 to 3 air changes per hour).	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
Provide a basic standard of general ventilation (1 to 3 air changes per hour).	Transfer of substance or mixture (charging and discharging) at dedicated facilities
Local exhaust ventilation	Transfer of substance or mixture (charging and discharging) at dedicated facilities
Provide a basic standard of general ventilation (1 to 3 air changes per hour).	Non industrial spraying
Local exhaust ventilation	Non industrial spraying
	See Section 7. Ensure operatives are trained to minimise exposures

Conditions and measures related to personal protection, hygiene and health evaluation	
See section 8 of the SDS for more information on personal protective equipment	

Other conditions affecting workers exposure	
See section 8 of the SDS.	

Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply
See Section 7 for information on safe handling. Handle product within a closed system. Apply a good standard of general or controlled ventilation when maintenance activities are carried out.

1.3. Exposure estimation and reference to its source

1.3.1. Environmental release and exposure: PC0, ERC2, ERC8a

The substance is not classified for human health hazards or for environment effects and it is not PBT or vPvB so that no exposure assessment or risk characterisation is required.

1.3.2. Worker exposure: PROC1, PROC8b, PROC11

The substance is not classified for human health hazards or for environment effects and it is not PBT or vPvB so that no exposure assessment or risk characterisation is required.

1.4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

1.4.1. Environment

Guidance - Environment	Check that RMMs and OCs are as described above or of equivalent efficiency

1.4.2. Health

Guidance - Health	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. For scaling see : http://www.ecetoc.org/tra

2. ES0210021793: Professional use, closed contained conditions

2.1. Title section

Professional use, closed contained conditions	
ES Ref.: ES0210021793	

Environment	Use descriptors
CS0310021793	ERC8b, ERC8e, ERC9a, ERC9b

Worker	Use descriptors
CS0410021793	PROC8a, PROC15, PROC16

2.2. Conditions of use affecting exposure

2.2.1. Control of environmental exposure: ERC8b, ERC8e, ERC9a, ERC9b

ERC8b	Widespread use of reactive processing aid (no inclusion into or onto article, indoor)
ERC8e	Widespread use of reactive processing aid (no inclusion into or onto article, outdoor)
ERC9a	Widespread use of functional fluid (indoor)
ERC9b	Widespread use of functional fluid (outdoor)

Product (article) characteristics	
Physical form of product	See section 9 of the SDS.
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently)

Amount used, frequency and duration of use (or from service life)	
The actual tonnage handled per site is not considered to influence the immissions as such for this scenario as there is practically no release	
Emission days	260 days/yr Batch process
Emission days	260 days/yr Continuous release

Technical and organisational conditions and measures	
	See chapter 8 of the safety data sheet (Environmental exposure controls).
Technical and organisational measures	Handle substance within a closed system
Air	98 % Air - minimum efficiency of
Soil	Not relevant
Water	Not relevant
Remarks	Not relevant
	None

Conditions and measures related to sewage treatment plant	
Wastewater emission controls are not applicable as there is no direct release to wastewater	

Conditions and measures related to treatment of waste (including article waste)	
See section 13 of the SDS	External treatment and disposal of waste should comply with applicable local and/or national regulations
See section 13 of the SDS	External recovery and recycling of waste should comply with applicable local and/or national regulations

Other conditions affecting environmental exposure	
Not relevant	

Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply
Ensure operatives are trained to minimise releases

2.2.2. Control of worker exposure: PROC8a, PROC15, PROC16

PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC15	Use as laboratory reagent
PROC16	Use of fuels

Product (article) characteristics	
Physical form of product	See section 9 of the SDS.
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently)

Amount used (or contained in articles), frequency and duration of use/exposure	
Not relevant	
Covers daily exposures up to 8 hours	5 days/week

Technical and organisational conditions and measures	
See Section 7	
Provide a basic standard of general ventilation (1 to 3 air changes per hour). Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
Local exhaust ventilation	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
Provide a good standard of controlled ventilation (10 to 15 air changes per hour)	Use as laboratory reagent
Local exhaust ventilation	Use as laboratory reagent
Provide a basic standard of general ventilation (1 to 3 air changes per hour).	Use of fuels
Local exhaust ventilation	Use of fuels
	See Section 7. Ensure operatives are trained to minimise exposures. Ensure supervision is in place to check that the RMMs are in place and are being used correctly and that the OCs are being followed

Other conditions affecting workers exposure	
	Not available
See section 8 of the SDS.	

Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply
See Section 7 for information on safe handling. Handle product within a closed system. Apply a good standard of general or controlled ventilation when maintenance activities are carried out.

2.3. Exposure estimation and reference to its source

2.3.1. Environmental release and exposure: ERC8b, ERC8e, ERC9a, ERC9b

The substance is not classified for human health hazards or for environment effects and it is not PBT or vPvB so that no exposure assessment or risk characterisation is required.

2.3.2. Worker exposure: PROC8a, PROC15, PROC16

The substance is not classified for human health hazards or for environment effects and it is not PBT or vPvB so that no exposure assessment or risk characterisation is required.

2.4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

2.4.1. Environment

Guidance - Environment	Check that RMMs and OCs are as described above or of equivalent efficiency

2.4.2. Health

Guidance - Health	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. For scaling see : http://www.ecetoc.org/tra

3. ES0310021793: Consumer use.

3.1. Title section

Consumer use.	
ES Ref.: ES0310021793	

3.2. Conditions of use affecting exposure

3.2.1. Control of environmental exposure: ERC8a, ERC8b, ERC8e

ERC8a	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)
ERC8b	Widespread use of reactive processing aid (no inclusion into or onto article, indoor)
ERC8e	Widespread use of reactive processing aid (no inclusion into or onto article, outdoor)

Product (article) characteristics	
Physical form of product	Gas
Concentration of substance in product	100
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently)

Amount used, frequency and duration of use (or from service life)	
Not relevant	
Emission days	< 260 days/yr Batch process
Continuous release	Not relevant

Conditions and measures related to treatment of waste (including article waste)	
Contain and dispose of waste according to local regulations	
Dispose of container via supplier only.	

Other conditions affecting environmental exposure	
Not relevant	

3.2.2. Control of consumer exposure: PC0, PC13

PC0	Other
PC13	Fuels

Product (article) characteristics	
Physical form of product	See section 9 of the SDS.
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently)

Amount used (or contained in articles), frequency and duration of use/exposure	
Amounts used	Handling of product in negligible amounts

Use frequency Exposure duration	< 5 days/week < 8 h Intermittent release

Measures related to information and behavioural advice to consumers including personal protection and hygiene	
See Section 8 for information on personal protection equipment	

Additional conditions - Human health	
Additional conditions - Human health	Keep away from children

Other conditions affecting consumer exposure	
	Not available
Other operational conditions	Not relevant
Indoor use	Provide adequate general and local exhaust ventilation.

3.3. Exposure estimation and reference to its source

3.3.1. Environmental release and exposure: ERC8a, ERC8b, ERC8e

The substance is not classified for human health hazards or for environment effects and it is not PBT or vPvB so that no exposure assessment or risk characterisation is required.

3.3.2. Consumer exposure: PC0, PC13

Information for contributing exposure scenario
As no toxicological hazard was identified no human-related (worker/consumer) exposure assessment and risk characterization was performed

3.4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

3.4.1. Environment

Guidance - Environment	Not applicable for wide dispersive uses

3.4.2. Health

Guidance - Health	Observe consumer instruction/communication on safe use.

End of document