ETBE (ETHYL TERT BUTYL ETHER)

Safety Data Sheet

according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878

Issue date: 7 September 2012 Revision date: 05 December 2022 Supersedes version of: 19 March 2018 Version: 5.0

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

1.1. Product identifier

Product form	:	Substance
Trade name	:	ETBE (ETHYL TERT BUTYL ETHER)
Chemical name	:	Ethyl tert-butyl ether
EC-No.	:	211-309-7
CAS-No.	:	637-92-3
REACH registration No	:	01-2119452785-29
Product Code	:	P320, P320C, P320S
Formula	:	C6H14O
Synonyms	:	Methyl-2-ethoxypropane; 2-Ethoxy-2methylpropane; 1,1-Dimethylethyl ethyl ether

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

1.2.1. Relevant identified uses

Industrial/Professional use spec	:	Industrial use
Use of the substance/mixture	:	Distribution Fuels

1.2.2. Uses advised against

No additional information available

1.3. Details of the supplier of the safety data sheet

Supplier:
Braskem Netherlands BV
Weena 238-240, 9th Floor Tower C
NL - 3012NJ- Rotterdam, Netherlands
Telephone: +31 10 798 5002
productsafety@braskem.com

1.4. Emergency telephone number

Emergency number	:	+1 703-741-5970 (International – 24 h)

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

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

Flammable liquids, Category 2	H225
Specific target organ toxicity – Single exposure, Category 3, Narcosis	H336

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

Adverse physicochemical, human health and environmental effects

Irritation of the respiratory tract and the other mucous membranes. Highly flammable liquid and vapour. May cause drowsiness or dizziness.

2.2. Label elements

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

Hazard pictograms (CLP) :

GHS02 GHS07

Signal word (CLP)	:	Danger
Hazard statements (CLP)	:	H225 - Highly flammable liquid and vapour. H336 - May cause drowsiness or dizziness.
Precautionary statements (CLP)	:	P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. P240 - Ground and bond container and receiving equipment. P261 - Avoid breathing vapours, mist. P271 - Use only outdoors or in a well-ventilated area. P304+P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing. P403+P235 - Store in a well-ventilated place. Keep cool.

2.3. Other hazards

other hazards which do not result in classification	:	Prolonged or repeated contact with the skin may cause dermatitis.

This substance/mixture does not meet the PBT criteria of REACH regulation, annex XIII
This substance/mixture does not meet the vPvB criteria of REACH regulation, annex XIII
Contains no PBT/vPvB substances ≥ 0.1% assessed in accordance with REACH Annex XIII

The substance is not included in the list established in accordance with Article 59(1) of REACH for having endocrine disrupting properties, or is not identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605

SECTION 3: Composition/information on ingredients

3.1. Substances

Name : Ethyl tert-butyl ether
CAS-No. : 637-92-3
EC-No. : 211-309-7

Name	Product identifier	%
Ethyl alcohol	CAS-No.: 64-17-5 EC-No.: 200-578-6 EC Index-No.: 603-002-00-5	< 3

3.2. Mixtures

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures general : Call a physician immediately.
First-aid measures after inhalation : Remove person to fresh air and keep comfortable for breathing. Give artificial respiration if necessary.
First-aid measures after skin contact : Rinse skin with water/shower. Take off immediately all contaminated clothing. If skin irritation occurs: Get medical advice/attention.
First-aid measures after eye contact : Rinse eyes with water as a precaution. Remove contact lenses if easy to do. If eye irritation persists: Get medical advice/attention.
First-aid measures after ingestion : Do not induce vomiting. Call a physician immediately. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs.

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

Symptoms/effects after inhalation : May cause drowsiness or dizziness. High concentration of vapours may induce: headache, dizziness, drowsiness, nausea and vomiting.
Symptoms/effects after skin contact : Mild skin irritation. Prolonged or repeated contact with the skin may cause dermatitis.
Symptoms/effects after eye contact : May cause moderate irritation, including burning sensation, tearing, redness or swelling.
Symptoms/effects after ingestion : Sore throat. May be harmful if swallowed and enters airways. May result in aspiration into the lungs, causing chemical pneumonia. Symptoms of ingestion include drowsiness, weakness, headache, dizziness, nausea, vomiting.

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

Treat symptomatically.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : Dry extinguishing powder. Foam. Carbon dioxide.
Unsuitable extinguishing media : Do not use a heavy water stream.

5.2. Special hazards arising from the substance or mixture

Fire hazard : Highly flammable liquid and vapour. Heavier than air, vapours may travel long distances along ground, ignite and flash back to source. Agitation can cause build up of electrostatic charge. Incomplete combustion releases dangerous carbon monoxide, carbon dioxide and other toxic gases.
Explosion hazard : Exposed to ignition source, vapours can burn in open / explode if confined. Prolonged exposure to fire may cause containers to rupture/explode.
Hazardous decomposition products in case of fire : Toxic fumes may be released.

5.3. Advice for firefighters

Firefighting instructions : Use water spray or fog for cooling exposed containers.
Protective equipment for firefighters : Do not attempt to take action without suitable protective equipment. Self-contained breathing apparatus. Complete protective clothing.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

Protective equipment : Wear suitable protective clothing, gloves and eye or face protection. For further information refer to section 8: "Exposure controls/personal protection".

Emergency procedures : Ventilate spillage area. No open flames, no sparks, and no smoking. Avoid breathing vapours, mist. Avoid contact with skin and eyes.

6.1.2. For emergency responders

Protective equipment : Do not attempt to take action without suitable protective equipment. For further information refer to section 8: "Exposure controls/personal protection".

Emergency procedures : Evacuate unnecessary personnel. Spill should be handled by trained cleaning personnel properly equipped with respiratory and eye protection. Eliminate ignition sources. Do not smoke.

6.2. Environmental precautions

Avoid release to the environment. Do not allow to enter into surface water or drains.

6.3. Methods and material for containment and cleaning up

For containment : Contain any spills with dikes or absorbents to prevent migration and entry into sewers or streams. Suppress the vapours given off, with vaporised water.

Methods for cleaning up : Take up liquid spill into absorbent material. Use only non-sparking tools. Notify authorities if product enters sewers or public waters.

Other information : Dispose of materials or solid residues at an authorized site.

6.4. Reference to other sections

For further information refer to section 8: "Exposure controls/personal protection". For disposal of residues refer to section 13 : "Disposal considerations".

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Additional hazards when processed : Handle empty containers with care because residual vapours are flammable.

Precautions for safe handling : Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Ground/bond container and receiving equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Electrostatic charges may be generated during handling. Flammable vapours may accumulate in the container. Use explosion-proof equipment. Wear personal protective equipment. Use only outdoors or in a well-ventilated area. Avoid breathing vapours, mist. Avoid contact with skin and eyes.

Hygiene measures : Wash contaminated clothing before reuse. Do not eat, drink or smoke when using this product. Always wash hands after handling the product.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures : Ground/bond container and receiving equipment.

Storage conditions : Store in a well-ventilated place. Keep cool. Keep container tightly closed. Store locked up.

Incompatible materials : Oxidizing agent. Strong acids.

Packaging materials : Drums. Stainless steel. Carbon steel.

7.3. Specific end use(s)

No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

8.1.1 National occupational exposure and biological limit values

ETHYL TERT-BUTYL ETHER (637-92-3)	
Belgium - Occupational Exposure Limits	
Local name	Ethyl-tert-butyl-éther (ETBE) # Ethyl tert-butyl ether (ETBE)
OEL TWA	21 mg/m³
OEL TWA [ppm]	5 ppm
Regulatory reference	Koninklijk besluit/Arrêté royal 11/05/2021
Finland - Occupational Exposure Limits	
Local name	Etyyli-tert-butyylieetteri

ETHYL TERT-BUTYL ETHER (637-92-3)	
HTP (OEL TWA) [1]	25 mg/m³
HTP (OEL TWA) [2]	5 ppm
Regulatory reference	HTP-ARVOT 2020 (Sosiaali- ja terveysministeriö)
Ireland - Occupational Exposure Limits	
Local name	2-Ethoxy-2-methylpropane [Ethyl tert-butyl ether]
OEL TWA [2]	25 ppm
OEL STEL [ppm]	75 ppm (calculated)
Regulatory reference	Chemical Agents Code of Practice 2021
Poland - Occupational Exposure Limits	
Local name	Eter tert-butyloetylowy
NDS (OEL TWA)	100 mg/m³
NDSCh (OEL STEL)	200 mg/m³
Regulatory reference	Dz. U. 2018 poz. 1286
Portugal - Occupational Exposure Limits	
Local name	Éter etil-terc-butílico (ETBE)
OEL TWA [ppm]	25 ppm
OEL chemical category	A4 - Not Classifiable as a Human Carcinogen
Remark	A4 (Agente não classificável como carcinogénico no Homem)
Regulatory reference	Norma Portuguesa NP 1796:2014
Spain - Occupational Exposure Limits	
Local name	Etil terc-butiléter (Éter etil terc-butílico (ETBE))
VLA-ED (OEL TWA) [1]	21 mg/m³
VLA-ED (OEL TWA) [2]	5 ppm
Regulatory reference	Límites de Exposición Profesional para Agentes Químicos en España 2022. INSHT
USA - ACGIH - Occupational Exposure Limits	
Local name	Ethyl tert-butyl ether (ETBE)
ACGIH OEL TWA [ppm]	25 ppm
Remark (ACGIH)	TLV® Basis: URT & LRT irr; CNS impair. Notations: A4 (Not classifiable as a Human Carcinogen)
Regulatory reference	ACGIH 2022

Ethyl alcohol (64-17-5)	
Austria - Occupational Exposure Limits	
Local name	Ethanol (Ethylalkohol)
MAK (OEL TWA)	1900 mg/m³
MAK (OEL TWA) [ppm]	1000 ppm
MAK (OEL STEL)	3800 mg/m³ (3x 60(Mow) min)
MAK (OEL STEL) [ppm]	2000 ppm (3x 60(Mow) min)
OEL C	3800 mg/m³
OEL C [ppm]	2000 ppm

Ethyl alcohol (64-17-5)	
Regulatory reference	BGBl. II Nr. 156/2021
Belgium - Occupational Exposure Limits	
Local name	Alcool éthylique # Ethanol
OEL TWA	1907 mg/m³
OEL TWA [ppm]	1000 ppm
Regulatory reference	Koninklijk besluit/Arrêté royal 11/05/2021
Bulgaria - Occupational Exposure Limits	
Local name	Етилов алкохол
OEL TWA	1000 mg/m³
Regulatory reference	Наредба № 13 от 30.12.2003 г. за защита на работещите от рискове, свързани с експозиция на химични агенти при работа (изм. и доп. ДВ. бр. 47 от 2021 г., в сила от 04.06.2021 г.)
Croatia - Occupational Exposure Limits	
Local name	Etanol; etil-alkohol
GVI (OEL TWA) [1]	1900 mg/m³
GVI (OEL TWA) [2]	1000 ppm
Regulatory reference	Pravilnik o zaštiti radnika od izloženosti opasnim kemikalijama na radu, graničnim vrijednostima izloženosti i biološkim graničnim vrijednostima (NN 1/2021)
Czech Republic - Occupational Exposure Limits	
Local name	Ethanol (Ethylalkohol)
PEL (OEL TWA)	1000 mg/m³
PEL (OEL TWA) [ppm]	522 ppm
NPK-P (OEL C)	3000 mg/m³
NPK-P (OEL C) [ppm]	1566 ppm
Regulatory reference	Nařízení vlády č. 361/2007 Sb. (Předpis 195/2021 Sb.)
Denmark - Occupational Exposure Limits	
Local name	Ethanol (Ethylalkohol)
OEL TWA [1]	1900 mg/m³
OEL TWA [2]	1000 ppm
Regulatory reference	BEK nr 2203 af 29. november 2021
Estonia - Occupational Exposure Limits	
Local name	Etanool (etüülalkohol)
OEL TWA	1000 mg/m³
OEL TWA [ppm]	500 ppm
OEL STEL	1900 mg/m³
OEL STEL [ppm]	1000 ppm
Regulatory reference	Vabariigi Valitsuse 20. märtsi 2001. a määruse nr 105 (RT I, 15.05.2021, 1)
Finland - Occupational Exposure Limits	
Local name	Etanoli
HTP (OEL TWA) [1]	1900 mg/m³

Ethyl alcohol (64-17-5)	
HTP (OEL TWA) [2]	1000 ppm
HTP (OEL STEL)	2500 mg/m³
HTP (OEL STEL) [ppm]	1300 ppm
Regulatory reference	HTP-ARVOT 2020 (Sosiaali- ja terveysministeriö)
France - Occupational Exposure Limits	
Local name	Alcool éthylique
VME (OEL TWA)	1900 mg/m³
VME (OEL TWA) [ppm]	1000 ppm
VLE (OEL C/STEL)	9500 mg/m³
VLE (OEL C/STEL) [ppm]	5000 ppm
Remark	Valeurs recommandées/admises
Regulatory reference	Circulaire du Ministère du travail (réf.: INRS ED 984, 2016)
Germany - Occupational Exposure Limits (TRGS 900)	
Local name	Ethanol
AGW (OEL TWA) [1]	380 mg/m³
AGW (OEL TWA) [2]	200 ppm
Peak exposure limitation factor	4(II)
Remark	DFG - Senatskommission zur Prüfung gesundheitsschädlicher Arbeitsstoffe der DFG (MAK-Kommission); Y - Ein Risiko der Fruchtschädigung braucht bei Einhaltung des Arbeitsplatzgrenzwertes und des biologischen Grenzwertes (BGW) nicht befürchtet zu werden
Regulatory reference	TRGS900
Greece - Occupational Exposure Limits	
Local name	Αιθνόλη
OEL TWA	1900 mg/m³
OEL TWA [ppm]	1000 ppm
Regulatory reference	Π.Δ. 90/1999 - Προστασία της υγείας των εργαζομένων που εκτίθενται σε ορισμένους χημικούς παράγοντες κατά τη διάρκεια της εργασίας τους
Hungary - Occupational Exposure Limits	
Local name	ETIL-ALKOHOL
AK (OEL TWA)	1900 mg/m³
CK (OEL STEL)	3800 mg/m³
Remark	N (Irritáló anyagok, egyszerű fojtógázok, csekély egészségkárosító hatással bíró anyagok)
Regulatory reference	5/2020. (II. 6.) ITM rendelet - A kémiai kóroki tényezők hatásának kitett munkavállalók egészségének és biztonságának védelméről
Ireland - Occupational Exposure Limits	
Local name	Ethanol [Ethyl alcohol]
OEL TWA [1]	1900 mg/m³
OEL TWA [2]	1000 ppm
OEL STEL [ppm]	1000 ppm
Regulatory reference	Chemical Agents Code of Practice 2021

Ethyl alcohol (64-17-5)	
Latvia - Occupational Exposure Limits	
Local name	Etilspirts (etanols)
OEL TWA	1000 mg/m³
Regulatory reference	Ministru kabineta 2007. gada 15. maija noteikumiem Nr. 325
Lithuania - Occupational Exposure Limits	
Local name	Etanolis (etilo alkoholis)
IPRV (OEL TWA)	1000 mg/m³
IPRV (OEL TWA) [ppm]	500 ppm
TPRV (OEL STEL)	1900 mg/m³
TPRV (OEL STEL) [ppm]	1000 ppm
Regulatory reference	LIETUVOS HIGIENOS NORMA HN 23:2011 (Nr. V-695/A1-272, 2018-06-12)
Netherlands - Occupational Exposure Limits	
Local name	Ethanol
TGG-8u (OEL TWA)	260 mg/m³
TGG-15min (OEL STEL)	1900 mg/m³
Remark	Kankerverwekkende stof. H (Huidopname) Stoffen die relatief gemakkelijk door de huid kunnen worden opgenomen, hetgeen een substantiële bijdrage kan betekenen aan de totale inwendige blootstelling, hebben in de lijst een H-aanduiding. Bij deze stoffen moeten naast maatregelen tegen inademing ook adequate maatregelen ter voorkoming van huidcontact worden genomen.
MAC chemical category	Skin notation
Regulatory reference	Arbeidsomstandighedenregeling 2022
Poland - Occupational Exposure Limits	
Local name	Etanol (alkohol etylowy)
NDS (OEL TWA)	1900 mg/m³
Regulatory reference	Dz. U. 2018 poz. 1286
Portugal - Occupational Exposure Limits	
Local name	Etanol (Álcool etílico)
OEL TWA [ppm]	1000 ppm
OEL STEL [ppm]	1000 ppm
OEL chemical category	A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans
Remark	A3 (Agente carcinogénico confirmado nos animais de laboratorio con relevância desconhecida no Homem)
Regulatory reference	Norma Portuguesa NP 1796:2014
Romania - Occupational Exposure Limits	
Local name	Alcool etilic/Etanol
OEL TWA	1900 mg/m³
OEL TWA [ppm]	1000 ppm
OEL STEL	9500 mg/m³
OEL STEL [ppm]	5000 ppm
Regulatory reference	Hotărârea Guvernului nr. 1.218/2006 (Hotărârea nr. 53/2021)

Ethyl alcohol (64-17-5)	
Slovakia - Occupational Exposure Limits	
Local name	Etylalkohol (etanol)
NPHV (OEL TWA) [1]	960 mg/m³
NPHV (OEL TWA) [2]	500 ppm
NPHV (OEL STEL)	1920 mg/m³
NPHV (OEL STEL) [ppm]	1000 ppm
NPHV (OEL C)	1920 mg/m³
Regulatory reference	Nariadenie vlády č. 355/2006 Z. z. (236/2020 Z. z.)
Slovenia - Occupational Exposure Limits	
Local name	etanol (etilalkohol)
OEL TWA	960 mg/m³
OEL TWA [ppm]	500 ppm
OEL STEL	1920 mg/m³
OEL STEL [ppm]	1000 ppm
Remark	Y (Snovi, pri katerih ni nevarnosti za zarodek ob upoštevanju mejnih vrednosti in bat vrednosti)
Regulatory reference	Uradni list RS, št. 72/2021 z dne 11.5.2021
Spain - Occupational Exposure Limits	
Local name	Etanol (Alcohol etílico)
VLA-ED (OEL TWA) [1]	1910 mg/m³
VLA-ED (OEL TWA) [2]	1000 ppm
VLA-EC (OEL STEL)	1910 mg/m³
VLA-EC (OEL STEL) [ppm]	1000 ppm
Remark	s (Esta sustancia tiene prohibida total o parcialmente su comercialización y uso como fitosanitario y/o como biocida. Para una información detallada acerca de las prohibiciones consúltese: Base de datos de productos biocidas: http://www.msssi.gob.es/ciudadanos/productos.do?tipo=plaguicidas Base de datos de productos fitosanitarios http://www.magrama.gob.es/agricultura/pags/fitos/registro/fichas/pdf/Lista_sa.pdf).
Regulatory reference	Límites de Exposición Profesional para Agentes Químicos en España 2022. INSHT
Sweden - Occupational Exposure Limits	
Local name	Etanol
NGV (OEL TWA)	1000 mg/m³
NGV (OEL TWA) [ppm]	500 ppm
KTV (OEL STEL)	1900 mg/m³
KTV (OEL STEL) [ppm]	1000 ppm
Remark	V (Vägledande korttidsgränsvärde ska användas som ett rekommenderat högsta värde som inte bör överskridas)
Regulatory reference	Hygieniska gränsvärden (AFS 2018:1)
Norway - Occupational Exposure Limits	
Local name	Etanol

Ethyl alcohol (64-17-5)	
Grenseverdi (OEL TWA) [1]	950 mg/m³
Grenseverdi (OEL TWA) [2]	500 ppm
Korttidsverdi (OEL STEL)	1187.5 mg/m³ (value calculated)
Korttidsverdi (OEL STEL) [ppm]	625 ppm (value calculated)
Regulatory reference	FOR-2021-06-28-2248
USA - ACGIH - Occupational Exposure Limits	
Local name	Ethanol
ACGIH OEL STEL [ppm]	1000 ppm
Remark (ACGIH)	TLV® Basis: URT irr. Notations: A3 (Confirmed Animal Carcinogen with Unknown Relevance to Humans)
ACGIH chemical category	Confirmed Animal Carcinogen with Unknown Relevance to Humans
Regulatory reference	ACGIH 2022

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

ETHYL TERT-BUTYL ETHER (637-92-3)	
DNEL/DMEL (Workers)	
Acute - systemic effects, inhalation	2800 mg/m³
Long-term - systemic effects, dermal	6767 mg/kg bodyweight/day
Long-term - systemic effects, inhalation	352 mg/m³
Long-term - local effects, inhalation	105 mg/m³
DNEL/DMEL (General population)	
Acute - local effects, inhalation	63 mg/m³
Long-term - systemic effects,oral	6 mg/kg bodyweight/day
Long-term - systemic effects, inhalation	105 mg/m³
Long-term - systemic effects, dermal	4060 mg/kg bodyweight/day
Long-term - local effects, inhalation	1680 mg/m³
PNEC (Water)	
PNEC aqua (freshwater)	0.51 mg/l
PNEC aqua (marine water)	0.017 mg/l
PNEC aqua (intermittent, freshwater)	11 mg/l
PNEC (Sediment)	
PNEC sediment (freshwater)	2.86 mg/kg dwt
PNEC sediment (marine water)	0.078 mg/kg dwt
PNEC (Soil)	
PNEC soil	0.274 mg/kg dwt

ETHYL TERT-BUTYL ETHER (637-92-3)	
PNEC (STP)	
PNEC sewage treatment plant	12.5 mg/l

8.1.5. Control banding

No additional information available

8.2. Exposure controls

8.2.1. Appropriate engineering controls

Appropriate engineering controls:
Ensure good ventilation of the work station. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.

8.2.2. Personal protection equipment

8.2.2.1. Eye and face protection

Eye protection:
Chemical goggles or safety glasses

8.2.2.2. Skin protection

Hand protection:
Impermeable protective gloves. Do not reuse gloves. It is recommended that the glove supplier be consulted to ensure the protective gloves are resistant to chemicals in this product

Hand protection					
Type	**Material**	**Permeation**	**Thickness (mm)**	**Penetration**	**Standard**
Disposable gloves, E.g. KCL Type: 730 or 890 or equivalent	Nitrile, or, Viton	< 480 minutes.	0,4 / 0,7	Not known	EN 374

8.2.2.3. Respiratory protection

Respiratory protection:
Approved organic vapour respirator. An approved organic vapour respirator/supplied air or self-contained breathing apparatus must be used when vapour concentration exceeds applicable exposure limits. Consult a national health and safety authority for further guidance

Respiratory protection			
Device	**Filter type**	**Condition**	**Standard**
Full face mask, with cartridge/filter	A	Concentrations exceed max allowed workplace atmospheric concentrations.	EN 14387

8.2.2.4. Thermal hazards

No additional information available

8.2.3. Environmental exposure controls

Environmental exposure controls:
Avoid release to the environment.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	:	Liquid
Colour	:	Colourless to slightly yellow.
Appearance	:	Clear.
Odour	:	Unpleasant odour. Terpenes
Odour threshold	:	Not available
Melting point	:	-94 °C
Freezing point	:	-94 °C
Boiling point	:	≈ 66.9 °C (760 mmHg)

Flammability	:	Solids:Not applicable
Explosive limits	:	1.42 – 10.08 vol %
Lower explosion limit	:	1.42 vol %
Upper explosion limit	:	10.08 vol %
Flash point	:	≈ -25 °C
Auto-ignition temperature	:	≈ 310 °C
Decomposition temperature	:	Not available
pH	:	≈ 6.4
Viscosity, kinematic	:	Not available
Viscosity, dynamic	:	0.4 mPa.s
Solubility	:	Water: ≈ 2.3 g/l Ethanol: Soluble
Partition coefficient n-octanol/water (Log Pow)	:	1.48 – 1.56 estimated
Vapour pressure	:	≈ 158 mm Hg (25°C)
Vapour pressure at 50°C	:	Not available
Density	:	0.743 (20 °C)
Relative density	:	Not available
Relative vapour density at 20°C	:	≈ 3.5 (15 - 32 °C)
Particle characteristics	:	Not applicable

9.2. Other information

9.2.1. Information with regard to physical hazard classes

No additional information available

9.2.2. Other safety characteristics

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

Highly flammable liquid and vapour. The product is non-reactive under normal conditions of use, storage and transport. May react violently with oxidants.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

No dangerous reactions known under normal conditions of use. No polymerization.

10.4. Conditions to avoid

Avoid contact with hot surfaces. Heat. No flames, no sparks. Eliminate all sources of ignition. Direct sunlight.

10.5. Incompatible materials

Oxidizing agent.

10.6. Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced. In case of fire: Carbon oxides (CO, CO2).

SECTION 11: Toxicological information

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

Acute toxicity (oral)	:	Not classified (Based on available data, the classification criteria are not met)
Acute toxicity (dermal)	:	Not classified (Based on available data, the classification criteria are not met)
Acute toxicity (inhalation)	:	Not classified (Based on available data, the classification criteria are not met)

ETHYL TERT-BUTYL ETHER (637-92-3)	
LD50 oral rat	> 2000 mg/kg
LD50 dermal rabbit	> 2 g/kg
LC50 Inhalation - Rat	> 5880 mg/m³ (Exposure time: 4 h)

Ethyl alcohol (64-17-5)	
LD50 oral rat	7060 mg/kg
LD50 dermal	15800 mg/kg bodyweight
LC50 Inhalation - Rat	133.8 mg/l/4h

Skin corrosion/irritation	:	Not classified (On basis of test data) pH: ≈ 6.4

Serious eye damage/irritation	:	Not classified (Based on available data, the classification criteria are not met) pH: ≈ 6.4
Respiratory or skin sensitisation	:	Not classified (Based on available data, the classification criteria are not met)
Germ cell mutagenicity	:	Not classified (Based on available data, the classification criteria are not met)
Carcinogenicity	:	Not classified (Based on available data, the classification criteria are not met)
Reproductive toxicity	:	Not classified (Based on available data, the classification criteria are not met)
STOT-single exposure	:	May cause drowsiness or dizziness.
STOT-repeated exposure	:	Not classified (Based on available data, the classification criteria are not met)

Ethyl alcohol (64-17-5)	
NOAEL (subchronic, oral, animal/male, 90 days)	< 9700 mg/kg bodyweight Animal: mouse, Animal sex: male, Guideline: EPA OPPTS 870.3100 (90-Day Oral Toxicity in Rodents)
NOAEL (subchronic, oral, animal/female, 90 days)	> 9400 mg/kg bodyweight Animal: mouse, Animal sex: female, Guideline: EPA OPPTS 870.3100 (90-Day Oral Toxicity in Rodents)

Aspiration hazard : Not classified (On basis of test data)

11.2. Information on other hazards

11.2.1. Endocrine disrupting properties

Adverse health effects caused by endocrine disrupting properties : None known

11.2.2. Other information

Other information : Likely routes of exposure: ingestion, inhalation, skin and eye

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general : The product is not considered harmful to aquatic organisms nor to cause long-term adverse effects in the environment.

Hazardous to the aquatic environment, short–term (acute) : Not classified (Based on available data, the classification criteria are not met)

Hazardous to the aquatic environment, long–term (chronic) : Not classified (Based on available data, the classification criteria are not met)

Ethyl alcohol (64-17-5)	
LC50 - Fish [1]	12 – 16 ml/l (Exposure time: 96 h - Species: Oncorhynchus mykiss [static])
LC50 - Fish [2]	> 100 mg/l (Exposure time: 96 h - Species: Pimephales promelas [static])
LC50 - Other aquatic organisms [1]	5012 mg/l 48 hours- daphnia
EC50 - Crustacea [1]	9268 – 14221 mg/l (Exposure time: 48 h - Species: Daphnia magna)
EC50 - Crustacea [2]	2 mg/l (Exposure time: 48 h - Species: Daphnia magna [Static])
EC50 - Other aquatic organisms [1]	5012 mg/l waterflea
EC50 - Other aquatic organisms [2]	275 mg/l
ErC50 algae	275 mg/l Source: ECHA
ErC50 other aquatic plants	4432 mg/l
NOEC (acute)	9.6 mg/l Daphnia magna
NOEC (chronic)	9.6 mg/l Test organisms (species): Daphnia magna Duration: '9 d'
NOEC chronic crustacea	9.6 mg/l

12.2. Persistence and degradability

ETHYL TERT-BUTYL ETHER (637-92-3)	
Persistence and degradability	Product is biodegradable.

12.3. Bioaccumulative potential

ETHYL TERT-BUTYL ETHER (637-92-3)	
Partition coefficient n-octanol/water (Log Pow)	1.48 – 1.56 estimated

ETHYL TERT-BUTYL ETHER (637-92-3)	
Bioaccumulative potential	Low bioaccumulation potential.

Ethyl alcohol (64-17-5)	
Partition coefficient n-octanol/water (Log Pow)	-0.35 (at 24 °C (at pH 7.4)

12.4. Mobility in soil

ETHYL TERT-BUTYL ETHER (637-92-3)	
Ecology - soil	Expected to be highly mobile in soil.

12.5. Results of PBT and vPvB assessment

ETHYL TERT-BUTYL ETHER (637-92-3)
This substance/mixture does not meet the PBT criteria of REACH regulation, annex XIII
This substance/mixture does not meet the vPvB criteria of REACH regulation, annex XIII

12.6. Endocrine disrupting properties

Adverse effects on the environment caused by endocrine disrupting properties : None known.

12.7. Other adverse effects

No additional information available

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste treatment methods : Dispose of contents/container in accordance with licensed collector's sorting instructions. Can be landfilled, when in compliance with local regulations. Can be incinerated according to local regulations.

Additional information : Flammable vapours may accumulate in the container.

SECTION 14: Transport information

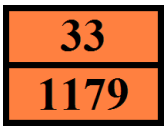
In accordance with ADR / IMDG / IATA / ADN / RID

ADR	IMDG	IATA	ADN	RID
14.1. UN number or ID number				
UN 1179	UN 1179	UN 1179	UN 1179	UN 1179
14.2. UN proper shipping name				
ETHYL BUTYL ETHER	ETHYL BUTYL ETHER	Ethyl butyl ether	ETHYL BUTYL ETHER	ETHYL BUTYL ETHER
Transport document description				
UN 1179 ETHYL BUTYL ETHER, 3, II, (D/E)	UN 1179 ETHYL BUTYL ETHER, 3, II (-1°C c.c.)	UN 1179 Ethyl butyl ether, 3, II	UN 1179 ETHYL BUTYL ETHER, 3, II	UN 1179 ETHYL BUTYL ETHER, 3, II
14.3. Transport hazard class(es)				
3	3	3	3	3
				
14.4. Packing group				
II	II	II	II	II
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 : This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material

Overland transport

Classification code (ADR)	:	F1
Limited quantities (ADR)	:	1l
Excepted quantities (ADR)	:	E2
Packing instructions (ADR)	:	P001, IBC02, R001
Mixed packing provisions (ADR)	:	MP19
Portable tank and bulk container instructions (ADR)	:	T4
Portable tank and bulk container special provisions (ADR)	:	TP1
Tank code (ADR)	:	LGBF
Vehicle for tank carriage	:	FL
Transport category (ADR)	:	2
Special provisions for carriage - Operation (ADR)	:	S2, S20
Hazard identification number (Kemler No.)	:	33
Orange plates	:	
Tunnel restriction code (ADR)	:	D/E

Transport by sea

Limited quantities (IMDG)	:	1 L
Excepted quantities (IMDG)	:	E2
Packing instructions (IMDG)	:	P001
IBC packing instructions (IMDG)	:	IBC02
Tank instructions (IMDG)	:	T4
Tank special provisions (IMDG)	:	TP1
EmS-No. (Fire)	:	F-E
EmS-No. (Spillage)	:	S-D
Stowage category (IMDG)	:	B
Flash point (IMDG)	:	-1°C c.c.
Properties and observations (IMDG)	:	Colourless liquid. Flashpoint: -1°C c.c. Immiscible with water.

Air transport

PCA Excepted quantities (IATA)	:	E2
PCA Limited quantities (IATA)	:	Y341
PCA limited quantity max net quantity (IATA)	:	1L
PCA packing instructions (IATA)	:	353
PCA max net quantity (IATA)	:	5L
CAO packing instructions (IATA)	:	364
CAO max net quantity (IATA)	:	60L
ERG code (IATA)	:	3L

Inland waterway transport

Classification code (ADN)	:	F1
Limited quantities (ADN)	:	1 L
Excepted quantities (ADN)	:	E2
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)	:	F1

Limited quantities (RID)	:	1L
Excepted quantities (RID)	:	E2
Packing instructions (RID)	:	P001, IBC02, R001
Mixed packing provisions (RID)	:	MP19
Portable tank and bulk container instructions (RID)	:	T4
Portable tank and bulk container special provisions (RID)	:	TP1
Tank codes for RID tanks (RID)	:	LGBF
Transport category (RID)	:	2
Colis express (express parcels) (RID)	:	CE7
Hazard identification number (RID)	:	33

14.7. Maritime transport in bulk according to IMO instruments

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)

Not listed on REACH Annex XVII

REACH Annex XIV (Authorisation List)

Not listed on REACH Annex XIV (Authorisation List)

REACH Candidate List (SVHC)

Not 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 1005/2009)

Explosives Precursors Regulation (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 (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

Listed on the United States TSCA (Toxic Substances Control Act) inventory - Status: Active
Listed on the Canadian NDSL (Non-Domestic Substances List)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)
Listed on the Japanese ENCS (Existing New Chemical Substances) inventory
Listed on KECL/KECI (Korean Existing Chemicals Inventory)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on the Japanese ISHL (Industrial Safety and Health Law)
Listed on the TCSI (Taiwan Chemical Substance Inventory)
Listed on the NCI (Vietnam - National Chemical Inventory)

France

Occupational diseases	
Code	Description
RG 84	Conditions caused by liquid organic solvents for professional use: saturated or unsaturated aliphatic or cyclic liquid hydrocarbons and mixtures thereof; liquid halogenated hydrocarbons; nitrated derivatives of aliphatic hydrocarbons; alcohols; glycols, glycol ethers; ketones; aldehydes; aliphatic and cyclic ethers, including tetrahydrofuran; esters; dimethylformamide and dimethylacetamine; acetonitrile and propionitrile; pyridine; dimethylsulfone and dimethylsulfoxide

Germany

Water hazard class (WGK) : WGK 1, Slightly hazardous to water (Classification according to VwVwS, Annex 3; ID No. 7257).

Hazardous Incident Ordinance (12. BImSchV) : Is not subject of the Hazardous Incident Ordinance (12. BImSchV)

Netherlands

SZW-lijst van kankerverwekkende stoffen : The substance is not listed

SZW-lijst van mutagene stoffen : The substance is not listed

SZW-lijst van reprotoxische stoffen – Borstvoeding : The substance is not listed

SZW-lijst van reprotoxische stoffen – Vruchtbaarheid : The substance is not listed

SZW-lijst van reprotoxische stoffen – Ontwikkeling : The substance is not listed

Denmark

Classification remarks : Emergency management guidelines for the storage of flammable liquids must be followed

Danish National Regulations : Young people under 18 years are not allowed to use the product

15.2. Chemical safety assessment

For this substance a chemical safety assessment has been carried out

SECTION 16: Other information

Indication of changes			
Section	**Changed item**	**Change**	**Comments**
2.1	Adverse physicochemical, human health and environmental effects	Modified	
2.2	Label elements	Modified	
2.3	Other hazards	Modified	
4.2	Most important symptoms and effects, both acute and delayed	Modified	
6.3	Methods and materials for containment and cleaning up	Modified	
7	Handling and storage	Modified	
8	Exposure controls / Personal protection equipment	Modified	
10	Stability and reactivity	Modified	
11	Toxicological information	Modified	
12.	Ecological information	Modified	
14	Transport information	Modified	
15	Regulatory information	Modified	

Full text of H- and EUH-statements:	
Flam. Liq. 2	Flammable liquids, Category 2
H225	Highly flammable liquid and vapour.
H336	May cause drowsiness or dizziness.
STOT SE 3	Specific target organ toxicity – Single exposure, Category 3, Narcosis

SDS EU (REACH Annex II)

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

1. Exposure scenario ES1

Distribution

ES Ref.: ES1 ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9, PROC15 SU3 ERC1, ERC2 ESVOC SPERC 1.1b.v1
Processes, tasks, activities covered	Loading (including marine vessel/barge, rail/road car and IBC loading) and repacking (including drums and small packs) of substance, including its sampling, storage, unloading, distribution and associated laboratory activities. Industrial use
Assessment method	Used ECETOC TRA model. Used EUSES model.

2. Operational conditions and risk management measures

2.1.1 Contributing scenario controlling worker exposure (PROC1) (Duration: Daily amount for wide disperse uses;Without LEV)

PROC1: Use in closed process, no likelihood of exposure

Product characteristics

Physical form of product	Liquid, vapour pressure > 10 kPa at STP.

Operational conditions

Amounts used	Covers percentage substance in the product up to 100 % (unless stated differently).	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature, unless stated differently.,Assumes a good basic standard of occupational hygiene is implemented.	

Risk Management Measures

2.1.2 Contributing scenario controlling worker exposure (PROC1) (Duration: Covers frequency up to: daily yearly use;Without LEV)

PROC1: Use in closed process, no likelihood of exposure

Product characteristics

Operational conditions

Risk Management Measures

Technical conditions and measures to control dispersion from source towards the worker	No special measures are necessary.	

2.1.3 Contributing scenario controlling worker exposure (PROC2) (Duration: 1-4 h;Without LEV)

PROC2: Use in closed, continuous process with occasional controlled exposure

Product characteristics

Vapour pressure	Vapour pressure > 10 kPa at STP.

Operational conditions

Frequency and duration of use	Avoid carrying out activities involving exposure for more than 4 hours.	General exposures (closed systems). with sample collection

Risk Management Measures

Technical conditions and measures to control dispersion from source towards the worker	Ensure operation is undertaken outdoors.	General exposures (closed systems). with sample collection
Conditions and measures related to personal protection, hygiene and health evaluation	Wear a respirator conforming to EN140 with Type A filter or better.	

2.1.4 Contributing scenario controlling worker exposure (PROC2) (Duration: daily; 8 hours;Without LEV)

PROC2: Use in closed, continuous process with occasional controlled exposure

Product characteristics

Operational conditions

Frequency and duration of use	Avoid carrying out activities involving exposure for more than 1 hour.	Storage. General exposures (closed systems). with sample collection

Risk Management Measures

Conditions and measures related to personal protection, hygiene and health evaluation	Wear a respirator conforming to EN140 with Type A filter or better.	

2.1.5 Contributing scenario controlling worker exposure (PROC3) (Duration: Daily amount for wide disperse uses;With LEV)

PROC3: Use in closed batch process (synthesis or formulation)

Product characteristics

Operational conditions

Risk Management Measures

Technical conditions and measures to control dispersion from source towards the worker	Provide extract ventilation to points where emissions occur.	General exposures (closed systems). Use in contained batch processes. with sample collection

2.1.6 Contributing scenario controlling worker exposure (PROC3) (Duration: 15 min;Without LEV)

PROC3: Use in closed batch process (synthesis or formulation)

Product characteristics

Operational conditions

Frequency and duration of use	Avoid carrying out activities involving exposure for more than 15 minutes.	Process sampling

Risk Management Measures

Conditions and measures related to personal protection, hygiene and health evaluation	Wear a respirator conforming to EN140 with Type A filter or better.	

2.1.7 Contributing scenario controlling worker exposure (PROC4) (Duration: Covers frequency up to: daily yearly use;With LEV)

PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises

Product characteristics

Operational conditions

Risk Management Measures

Technical conditions and measures to control dispersion from source towards the worker	Provide extract ventilation to points where emissions occur.,Ensure samples are obtained under containment or extract ventilation.	General exposures (open systems). Batch process. with sample collection. Filling / preparation of equipment from drums or containers

2.1.8 Contributing scenario controlling worker exposure (PROC8a) (Duration: 1-4;With LEV)

PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Product characteristics

Operational conditions

Frequency and duration of use	Avoid carrying out activities involving exposure for more than 4 hours.	Bulk open loading and unloading. Non-dedicated facility

Risk Management Measures

Technical conditions and measures to control dispersion from source towards the worker	Ensure material transfers are under containment or extract ventilation.	Bulk open loading and unloading. Non-dedicated facility
Conditions and measures related to personal protection, hygiene and health evaluation	Wear a respirator conforming to EN140 with Type A filter or better.	

2.1.9 Contributing scenario controlling worker exposure (PROC8a) (Duration: 1-4h;Without LEV)

PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Product characteristics

Operational conditions

Frequency and duration of use	Avoid carrying out activities involving exposure for more than 4 hours.	Equipment cleaning and maintenance. Non-dedicated facility

Risk Management Measures

Technical conditions and measures to control dispersion from source towards the worker	Drain down and flush system prior to equipment break-in or maintenance.	Equipment cleaning and maintenance. Non-dedicated facility
Conditions and measures related to personal protection, hygiene and health evaluation	Wear a respirator conforming to EN140 with Type A filter or better.	

2.1.10 Contributing scenario controlling worker exposure (PROC8b) (Duration: 15 min- 1 hour;Without LEV)

PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

Product characteristics

Operational conditions

Frequency and duration of use	Avoid carrying out activities involving exposure for more than 1 hour.	Bulk closed loading and unloading. Dedicated facility

Risk Management Measures

Technical conditions and measures to control dispersion from source towards the worker	Ensure operation is undertaken outdoors.	Bulk closed loading and unloading. Dedicated facility
Conditions and measures related to personal protection, hygiene and health evaluation	Wear a respirator conforming to EN140 with Type A filter or better.	

2.1.11 Contributing scenario controlling worker exposure (PROC9) (Duration: Daily amount for wide disperse uses;With LEV)

PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product characteristics

Operational conditions

Risk Management Measures

Technical conditions and measures to control dispersion from source towards the worker	Fill containers/cans at dedicated fill points supplied with local extract ventilation.	Drum and small package filling. Dedicated facility

2.1.12 Contributing scenario controlling worker exposure (PROC15) (Duration: > 4 hours;With LEV)

PROC15: Use as laboratory reagent

Product characteristics

Operational conditions

Risk Management Measures

Technical conditions and measures to control dispersion from source towards the worker	Provide a good standard of controlled ventilation (10 to 15 air changes per hour).	Laboratory activities. cleaning

2.2 Contributing scenario controlling environmental exposure

ERC1:Manufacture of substances

ERC2:Formulation of preparations

ESVOC SPERC 1.1b.v1:Distribution: Industrial (SU3)

Product characteristics

Physical form of product	liquid
Concentration of substance in product	100 %
Vapour pressure	Vapour pressure > 10 kPa at STP.

Operational conditions

Amounts used	Regional use tonnage (tons/year):	901000
	Annual site tonnage (tons/year):	18020
	Maximum daily site tonnage (kg/day):	51486
	Fraction of EU tonnage used in region:	1
	Fraction of Regional tonnage used locally:	0.02
Frequency and duration of use	Emission days (days/year):	350
Other given operational conditions affecting environmental exposure		
	Release fraction to air from process (initial release prior to RMM):	0.0001
	Release fraction to wastewater from process (initial release prior to RMM):	0.00001
	Release fraction to soil from wide dispersive use (regional only):	0.00001

Risk Management Measures

Technical conditions and measures at process level (source) to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	No air emission controls required; required removal efficiency is 0%.	
	Soil emission controls are not applicable as there is no direct release to soil.	
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ... [3] (%):	> 97
Organisational measures to prevent/limit release from site	Prevent environmental discharge consistent with regulatory requirements.	
Conditions and measures related to municipal sewage treatment plant	Maximum allowable site tonnage (MSafe) (kg/d):	5720667
	Assumed domestic sewage treatment plant flow (m3/d):	2000
Conditions and measures related to external treatment of waste for disposal	Not applicable.	
Conditions and measures related to external recovery of waste	Not applicable.	

3. Exposure estimation and reference to its source

3.1. Health

Long-term - systemic effects						
DNEL	Inhalation: 25 mg/m³/day Dermal: 6767 mg/kg bodyweight/day					
Contributing scenario	inhalation exposure mg/m³	RCR	Dermal exposure mg/kg bodyweight/day	RCR	Sum RCR	Assessment method
PROC1 Duration: Daily amount for wide disperse	0.01	0.000	0.34	0.000	0.000	Inhalation.: Used ECETOC TRA model. Dermal: Used ECETOC TRA model.

uses,Without LEV						
PROC1 Duration: Covers frequency up to: daily yearly use,Without LEV	0.01	0.000	0.34	0.000	0.000	Inhalation.: Used ECETOC TRA model. Dermal: Used ECETOC TRA model.
PROC2 Duration: 1-4 h,Without LEV	21	0.84	1.37	0.000	0.840	Inhalation.: Used ECETOC TRA model. Dermal: Used ECETOC TRA model.
PROC2 Duration: daily; 8 hours,Without LEV	10	0.4	1.37	0.000	0.400	Inhalation.: Used ECETOC TRA model. Dermal: Used ECETOC TRA model.
PROC3 Duration: Daily amount for wide disperse uses,With LEV	10	0.4	0.34	0.000	0.400	Inhalation.: Used ECETOC TRA model. Dermal: Used ECETOC TRA model.
PROC3 Duration: 15 min,Without LEV	10	0.4	0.34	0.000	0.400	Inhalation.: Used ECETOC TRA model. Dermal: Used ECETOC TRA model.
PROC4 Duration: Covers frequency up to: daily yearly use,With LEV	10	0.4	6.86	0.001	0.401	Inhalation.: Used ECETOC TRA model. Dermal: Used ECETOC TRA model.
PROC8a Duration: 1-4,With LEV	15	0.6	0.34	0.000	0.600	Inhalation.: Used ECETOC TRA model. Dermal: Used ECETOC TRA model.
PROC8a Duration: 1-4h,Without LEV	15	0.6	13.71	0.002	0.602	Inhalation.: Used ECETOC TRA model. Dermal: Used ECETOC TRA model.
PROC8b Duration: 15 min-1 hour,Without LEV	21	0.84	6.86	0.001	0.841	Inhalation.: Used ECETOC TRA model. Dermal: Used ECETOC TRA model.
PROC9 Duration: Daily amount for wide disperse uses,With LEV	20	0.8	6.86	0.001	0.801	Inhalation.: Used ECETOC TRA model. Dermal: Used ECETOC TRA model.
PROC15 Duration: > 4 hours,With LEV	15	0.6	0.34	0.000	0.600	Inhalation.: Used ECETOC TRA model. Dermal: Used ECETOC TRA model.

3.2. Environment

ERC1, ERC2 ESVOC SPERC 1.1b.v1					
environmental exposure	Unit	Exposure Estimation	PNEC	RCR	Assessment method
freshwater	mg/l	0.000147	0.51	0.000	Used EUSES model.
marine water	mg/l	0.000161	0.017	0.009	Used EUSES model.
freshwater sediment	mg/kg dwt	0.00179	28.5	0.000	Used EUSES model.
Marine water sediment	mg/kg dwt	0.000195	1.45	0.000	Used EUSES model.
Sewage treatment plant	mg/l	0.01	12.5	0.001	Used EUSES model.
Soil	mg/kg dwt	0.000682	2.41	0.000	Used EUSES model.

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

4.1. Health

Guidance - Health	Estimated workplace exposures are not expected to exceed DNELs when the identified risk management measures are adopted.,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

4.2. Environment

Guidance - Environment	When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted PNECs and the resulting risk characterisation ratios are expected to be less than 1.

1. Exposure scenario ES2

Fuels

ES Ref.: ES2 ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC16 SU3 ERC8b ESVOC SPERC 1.1b.v1
Processes, tasks, activities covered	Covers the use as a fuel (or fuel additive), and includes activities associated with its transfer, use, equipment maintenance and handling of waste. Industrial use
Assessment method	Used ECETOC TRA model. Used EUSES model.

2. Operational conditions and risk management measures

2.1.1 Contributing scenario controlling worker exposure (PROC1) (Duration: daily; > 4 hours;Without LEV)

PROC1: Use in closed process, no likelihood of exposure

Product characteristics

Physical form of product	liquid
Vapour pressure	Vapour pressure > 10 kPa at STP.

Operational conditions

Amounts used		Covers percentage substance in the product up to 15% (all PROCs)
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
	Avoid carrying out activities involving exposure for more than 4 hours.	PROC 8a & 8b
Human factors not influenced by risk management	Not applicable	
Other given operational conditions affecting workers exposure	Assumes a good basic standard of occupational hygiene is implemented.	

Risk Management Measures

2.1.2 Contributing scenario controlling worker exposure (PROC1) (Duration: daily; 8 hours;Without LEV)

PROC1: Use in closed process, no likelihood of exposure

Product characteristics

Operational conditions

Risk Management Measures

Technical conditions and measures to control dispersion from source towards the worker	No special measures are necessary.	

2.1.3 Contributing scenario controlling worker exposure (PROC2) (Duration: daily; 8 hours;Without LEV)

PROC2: Use in closed, continuous process with occasional controlled exposure

Product characteristics

Operational conditions

Risk Management Measures

Technical conditions and measures to control dispersion from source towards the worker	Ensure operation is undertaken outdoors.	Storage. General exposures (closed systems). with sample collection

2.1.4 Contributing scenario controlling worker exposure (PROC2) (Duration: daily; > 4 hours;With LEV)

PROC2: Use in closed, continuous process with occasional controlled exposure

Product characteristics

Operational conditions

Risk Management Measures

Technical conditions and measures to control dispersion from source towards the worker	Provide extract ventilation to material transfer points and other openings.	General exposures (closed systems). with sample collection

2.1.5 Contributing scenario controlling worker exposure (PROC3) (Duration: daily; > 4 hours;With LEV)

PROC3: Use in closed batch process (synthesis or formulation)

Product characteristics

Operational conditions

Risk Management Measures

Technical conditions and measures to control dispersion from source towards the worker	Provide extract ventilation to points where emissions occur.	General exposures (closed systems). Use in contained batch processes. with sample collection

2.1.6 Contributing scenario controlling worker exposure (PROC3) (Duration: daily; > 4 hours;With LEV)

PROC3: Use in closed batch process (synthesis or formulation)

Product characteristics

Operational conditions

Risk Management Measures

Technical conditions and measures to control dispersion from source towards the worker	Provide extract ventilation to material transfer points and other openings.	Batch process. (closed systems)

2.1.7 Contributing scenario controlling worker exposure (PROC8a) (Duration: daily; 1 - 4 hours;Without LEV)

PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Product characteristics

Operational conditions

Frequency and duration of use	Avoid carrying out activities involving exposure for more than 4 hours.	Equipment cleaning and maintenance. Non-dedicated facility

Risk Management Measures

Technical conditions and measures to control dispersion from source towards the worker	Drain down system prior to equipment break-in or maintenance.	Equipment cleaning and maintenance. Non-dedicated facility

2.1.8 Contributing scenario controlling worker exposure (PROC8b) (Duration: daily; > 4 hours;With LEV)

PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

Product characteristics

Operational conditions

Risk Management Measures

Technical conditions and measures to control dispersion from source towards the worker	Use drum pumps.	Drum/batch transfers. Filling / preparation of equipment from drums or containers. Bulk transfers. Dedicated facility

2.1.9 Contributing scenario controlling worker exposure (PROC8b) (Duration: daily; 1 - 4 hours;With LEV)

PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities

Product characteristics

Operational conditions

Frequency and duration of use	Avoid carrying out activities involving exposure for more than 4 hours.	Bulk transfers. Batch process. with sample collection. Filling /

		preparation of equipment from drums or containers

Risk Management Measures

Technical conditions and measures to control dispersion from source towards the worker	Handle substance within a predominantly closed system provided with extract ventilation.	Bulk transfers. Batch process. with sample collection. Filling / preparation of equipment from drums or containers
Conditions and measures related to personal protection, hygiene and health evaluation	Wear a respirator conforming to EN140 with Type A filter or better.	

2.1.10 Contributing scenario controlling worker exposure (PROC16) (Duration: daily; > 4 hours;Without LEV)

PROC16: Using material as fuel sources, limited exposure to unburned product to be expected

Product characteristics

Operational conditions

Risk Management Measures

Technical conditions and measures to control dispersion from source towards the worker	No special measures are necessary.	

2.2 Contributing scenario controlling environmental exposure

ERC8b:Wide dispersive indoor use of reactive substances in open systems

ESVOC SPERC 1.1b.v1:Distribution: Industrial (SU3)

Product characteristics

Physical form of product	liquid
Vapour pressure	Vapour pressure > 10 kPa at STP.

Operational conditions

Amounts used	Regional use tonnage (tons/year):	901000
	Annual site tonnage (tons/year):	18020
	Maximum daily site tonnage (kg/day):	51486
	Fraction of Regional tonnage used locally:	0.02
Frequency and duration of use	Emission days (days/year):	350
Other given operational conditions affecting environmental exposure	Release fraction to air from process (initial release prior to RMM):	0.0001
	Release fraction to wastewater from process (initial release prior to RMM):	0.00001
	Release fraction to soil from wide dispersive use (regional only):	0.00001

Risk Management Measures

Technical conditions and measures at process level (source) to prevent release	Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	No air emission controls required; required removal efficiency is 0%.,Soil emission controls are not applicable as there is no direct release to soil.	
	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ... [3] (%):	> 95
Organisational measures to prevent/limit release from site	Prevent environmental discharge consistent with regulatory requirements.	
Conditions and measures related to municipal sewage treatment plant	Maximum allowable site tonnage (MSafe) (kg/d):	5720667
	Assumed domestic sewage treatment plant flow (m3/d):	2000
Conditions and measures related to external treatment of waste for disposal	Not applicable.	
Conditions and measures related to external recovery of waste	Not applicable.	

3. Exposure estimation and reference to its source

3.1. Health

Long-term - systemic effects

DNEL	Inhalation: 25 mg/m³/day Dermal: 6767 mg/kg bodyweight/day					
Contributing scenario	inhalation exposure mg/m³	RCR	Dermal exposure mg/kg bodyweight/day	RCR	Sum RCR	Assessment method
PROC1 Duration: daily; > 4 hours,Without LEV	0.01	0.000	0.2	0.000	0.000	Inhalation.: Used ECETOC TRA model. Dermal: Used ECETOC TRA model.
PROC1 Duration: daily; 8 hours,Without LEV	0.006	0.000	0.2	0.000	0.000	Inhalation.: Used ECETOC TRA model. Dermal: Used ECETOC TRA model.
PROC2 Duration: daily; 8 hours,Without LEV	21	0.84	0.82	0.000	0.840	Inhalation.: Used ECETOC TRA model. Dermal: Used ECETOC TRA model.
PROC2 Duration: daily; > 4 hours,With LEV	3	0.12	0.82	0.000	0.120	Inhalation.: Used ECETOC TRA model. Dermal: Used ECETOC TRA model.
PROC3 Duration: daily; > 4 hours,With LEV	6	0.24	0.2	0.000	0.240	Inhalation.: Used ECETOC TRA model. Dermal: Used ECETOC TRA model.
PROC3 Duration: daily; > 4 hours,With LEV	6	0.24	0.2	0.000	0.240	Inhalation.: Used ECETOC TRA model. Dermal: Used ECETOC TRA model.
PROC8a Duration: daily; 1 - 4 hours,Without LEV	18	0.72	8.23	0.001	0.721	Inhalation.: Used ECETOC TRA model. Dermal: Used ECETOC TRA model.
PROC8b Duration: daily; > 4 hours,With LEV	18	0.72	8.23	0.001	0.721	Inhalation.: Used ECETOC TRA model. Dermal: Used ECETOC TRA model.
PROC8b Duration: daily; 1 - 4 hours,With LEV	10.8	0.432	4.12	0.001	0.433	Inhalation.: Used ECETOC TRA model. Dermal: Used ECETOC TRA model.
PROC16 Duration: daily; > 4 hours,Without LEV	15	0.6	0.2	0.000	0.600	Inhalation.: Used ECETOC TRA model. Dermal: Used ECETOC TRA model.

3.2. Environment

ERC8b ESVOC SPERC 1.1b.v1					
environmental exposure	Unit	Exposure Estimation	PNEC	RCR	Assessment method
freshwater	mg/l	0.000147	0.51	0.000	Used EUSES model.
marine water	mg/l	0.000161	0.017	0.009	Used EUSES model.
freshwater sediment	mg/kg dwt	0.00179	28.5	0.000	Used EUSES model.
Marine water sediment	mg/kg dwt	0.000195	1.45	0.000	Used EUSES model.
Sewage treatment plant	mg/l	0.01	12.5	0.001	Used EUSES model.
Soil	mg/kg dwt	0.000682	2.41	0.000	Used EUSES model.

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

4.1. Health

Guidance - Health	Estimated workplace exposures are not expected to exceed DNELs when the identified risk management measures are adopted.,Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

4.2. Environment

Guidance - Environment	When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted PNECs and the resulting risk characterisation ratios are expected to be less than 1.

Braskem - SDS_EU (modified 221026)

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. It warns that the handling of any chemical substance requires the previous knowledge of its hazards for the user. It is up to the user of the product company providing this SDS to and promote the training of its employees about possible risks come upon of the product. The information contained herein is not absolute, but only general information on the use of the chemical and indication of safety and security measures.