

### 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)  
 EC no : 211-309-7  
 CAS No. : 637-92-3  
 REACH registration No. : 01-2119452785-29  
 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

Main use category : Industrial use  
 Industrial/Professional use spec. : fuel additive  
 Used in closed systems  
 Use of the substance/preparation : Distribution  
 Fuels  
 Function or use category : Fuel additives

##### 1.2.2. Uses advised against

No additional information available

#### 1.3. Details of the supplier of the safety data sheet

Supplier (Only Representative):  
 Braskem Netherland BV  
 Weena 238-240, 9th Floor, Tower C  
 NL - 3012 NJ – Rotterdam

Manufacturer:  
 Rua Eteno, 1561  
 Polo Petroquímico de Camaçari  
 42810-000 – Camaçari – BA – Brasil

Braskem S.A.  
 BR 386 – Rodovia Tabai - Canoas, km 419  
 Via do Contorno, 850  
 95853-000 – Triunfo – RS – Brasil

productsafety@braskem.com

#### 1.4. Emergency telephone number

Emergency number : +31 10 205 2945 (business hours)

### SECTION 2: Hazards identification

#### 2.1. Classification of the substance or mixture

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

Flam. Liq. 2 H225  
 STOT SE 3 H336

Full text of H-phrases: see section 16

##### Adverse physicochemical, human health and environmental effects

irritation of the mucous membrane and the respiratory system and adverse effects on the renal and central nervous systems. Highly flammable liquid and vapour. Irritating to eyes and skin. Vapours may cause drowsiness and dizziness.

#### 2.2. Label elements

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

Hazard pictograms (CLP) :



GHS02

GHS07

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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, open flames, sparks. - No smoking. P243 - Take precautionary measures against static discharge P261 - Avoid breathing fume, gas, mist, spray, vapours. P271 - Use only outdoors or in a well-ventilated area P304+P340 - IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing P403+P235 - Store in a cool and well-ventilated place.

### 2.3. Other hazards

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

## SECTION 3: Composition/information on ingredients

### 3.1. Substances

Substance type : Mono-constituent

Name	Product identifier	%
Ethanol	(CAS No.) 64-17-5	< 3

Full text of R-, H- and EUH-phrases: see section 16

### 3.2. Mixtures

Not applicable

## SECTION 4: First aid measures

### 4.1. Description of first aid measures

First-aid measures general	: Never give anything by mouth to an unconscious person.
First-aid measures after inhalation	: Move to fresh air. In case of breathing difficulties administer oxygen. Give artificial respiration if necessary. Seek medical advice.
First-aid measures after skin contact	: Remove contaminated clothing and shoes. Rinse thoroughly with plenty of water for at least 20 minutes and take medical advice.
First-aid measures after eye contact	: Rinse immediately with plenty of water for 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Seek medical advice.
First-aid measures after ingestion	: Do not induce vomiting. Immediately get medical attention.

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

Symptoms/injuries after inhalation	: High concentration of vapours may induce: headache, dizziness, drowsiness, nausea and vomiting.
Symptoms/injuries after skin contact	: Irritating to skin.
Symptoms/injuries after eye contact	: In case of repeated or prolonged exposure : tearing. Causes serious eye irritation.
Symptoms/injuries after ingestion	: Ingestion causes nausea, weakness and central nervous system effects. May be fatal if swallowed and enters airways.

### 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:	: carbon dioxide (CO <sub>2</sub> ), water, dry chemical powder.
Unsuitable extinguishing media	: Do not use a water jet since it may cause the fire to spread.

### 5.2. Special hazards arising from the substance or mixture

Fire hazard	: Highly flammable. Vapours can travel considerable distances to a source of ignition where they can ignite, flash back, or explode. This material can accumulate static charge by flow or agitation and can be ignited by static discharge. combustible products.
Explosion hazard	: Exposed to ignition source, vapours can burn in open / explode if confined. Exposure to fire may cause containers to rupture/explode.
Reactivity	: May react violently with oxidants.

### 5.3. Advice for firefighters

Protective equipment for firefighters : Use self-contained breathing apparatus and chemically protective clothing. For further information refer to section 8 : Exposure-controls/personal protection.

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### 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/face protection. For further information refer to section 8 Exposure controls/personal protection " .
- Emergency procedures : Eliminate ignition sources. Do not smoke.

##### 6.1.2. For emergency responders

- Protective equipment : Refer to section 8. Wear suitable protective clothing.
- 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

Do not allow to enter into surface water or drains.

#### 6.3. Methods and material for containment and cleaning up

- For containment : Suppress gases/vapours/mists with water spray jet. Prevent spread over a wide area (e.g. by containment or oil barriers).
- Methods for cleaning up : Absorb remaining liquid with sand or inert absorbent and remove to safe place.

#### 6.4. Reference to other sections

No additional information available

### SECTION 7: Handling and storage

#### 7.1. Precautions for safe handling

- Precautions for safe handling : Avoid contact with skin, eyes and clothes. Avoid inhalation of product. Remove all sources of ignition. Use personal protective equipment as required. Do not eat, drink and do not smoke in areas where product is used. Wash hands and other exposed areas with mild soap and water before eat, drink or smoke and when leaving work. Wash contaminated clothing before reuse.

#### 7.2. Conditions for safe storage, including any incompatibilities

- Technical measures: : Ground equipment electrically. Keep away from sources of ignition - No smoking. Provide adequate ventilation.
- Storage condition(s) : Store in dry, cool, well-ventilated area. Keep away from ignition sources (including static discharges). Keep container tightly closed.
- Incompatible products : Keep away from: strong oxidants and 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

2-ethoxy-2-methylpropane (637-92-3)		
Belgium	Limit value (mg/m <sup>3</sup> )	21 mg/m <sup>3</sup>
Belgium	Limit value (ppm)	5 ppm
Italy - Portugal - USA ACGIH	ACGIH TWA (ppm)	5 ppm
Spain	VLA-ED (mg/m <sup>3</sup> )	21 mg/m <sup>3</sup>
Spain	VLA-ED (ppm)	5 ppm
Finland	HTP-arvo (8h) (mg/m <sup>3</sup> )	25 mg/m <sup>3</sup>
Finland	HTP-arvo (8h) (ppm)	5 ppm

ETBE (ETHYL TERT BUTYL ETHER) (637-92-3)	
DNEL/DMEL (Workers)	
Acute - systemic effects, inhalation	(667 ppm) mg/m <sup>3</sup>
Long-term - systemic effects, dermal	6767 mg/kg bodyweight/day
Long-term - systemic effects, inhalation	25 mg/m <sup>3</sup> /day (25 ppm)
Long-term - local effects, inhalation	105 mg/m <sup>3</sup> /day
DNEL/DMEL (General population)	
Acute - systemic effects, inhalation	1680 mg/m <sup>3</sup>
Long-term - systemic effects, oral	12.5 mg/kg bodyweight/day
Long-term - systemic effects, inhalation	105 mg/m <sup>3</sup> /day
Long-term - systemic effects, dermal	4060 mg/kg bodyweight/day
Long-term - local effects, inhalation	63 mg/m <sup>3</sup> /day
PNEC (Water)	

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ETBE (ETHYL TERT BUTYL ETHER) (637-92-3)	
PNEC aqua (freshwater)	0.51 mg/l
PNEC aqua (marine water)	0.017 mg/l
PNEC aqua (intermittent, freshwater)	1.1 mg/l (remove freshwater)
PNEC (Sediment)	
PNEC sediment (freshwater)	28.5 mg/kg dwt
PNEC sediment (marine water)	1.45 mg/kg dwt
PNEC (Soil)	
PNEC soil	2.41 mg/kg dwt
PNEC (STP)	
PNEC sewage treatment plant	12.5 mg/l

### 8.2. Exposure controls

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

Personal protective equipment : Gas mask. Gloves. Protective goggles. Protective clothing.



Materials for protective clothing : anti-static clothing in natural material or heat resistant synthetic material. Protective gloves made of PVC.

Hand protection : Avoid contact with skin.

Eye protection : Wear eye protection/face protection.

Skin and body protection : When skin contact is possible, protective clothing including gloves, apron, sleeves, boots, head and face protection must be worn.

Respiratory protection : Wear respiratory protection.

Thermal hazard protection : Protective non-flammable clothing.

Environmental exposure controls : Avoid release to the environment. Do not allow run-off from fire-fighting to enter drains or water courses.

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

Physical state	: Liquid
Colour	: Colourless to light yellow
odour	: Similar to terpenes
Odour threshold	: No data available
pH	: ~ 6.4
Relative evaporation rate (butylacetate=1)	: No data available
Melting point	: -94 °C
Freezing point	: No data available
Boiling point	: ~ 66.9 °C
Flash point	: ~ -25 °C
Self ignition temperature	: ~ 310 °C
Decomposition temperature	: No data available
Flammability (solid, gas)	: Flammable
Vapour pressure	: 158 mm Hg (25°C)
Relative vapour density at 20 °C	: Aprox. 3,5 (15-32°C)
Relative density	: 0,743 (20°C) (water=1)
Solubility	: Soluble in: Ethanol. Water: 2.30 g/l
Log Pow	: ~ 1,48 - 1,56
Log Kow	: No data available
Viscosity, kinematic	: No data available
Viscosity, dynamic	: 0.4 mPa.s
Explosive properties	: No data available
Oxidising properties	: No data available
Explosive limits	: 1.42 – 10.08 %

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### 9.2. Other information

No additional information available

## SECTION 10: Stability and reactivity

### 10.1. Reactivity

May react violently with oxidants.

### 10.2. Chemical stability

Stable under normal conditions.

### 10.3. Possibility of hazardous reactions

No polymerization .

### 10.4. Conditions to avoid

Avoid ignition sources. Direct sunlight. sparks.

### 10.5. Incompatible materials

Strong acid. Oxidizing agents, strong.

### 10.6. Hazardous decomposition products

Carbon dioxide (CO<sub>2</sub>). Carbon monoxide.

## SECTION 11: Toxicological information

### 11.1. Information on toxicological effects

Acute toxicity : Not classified

#### 2-ethoxy-2-methylpropane (637-92-3)

LD50 oral rat	> 2000 mg/kg
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LD50 dermal rabbit	> 2000 mg/kg
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LC50 inhalation rat (mg/l)	> 5.88 mg/l
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Skin corrosion/irritation : Not classified  
pH: ~ 6.4

Serious eye damage/irritation : Not classified  
pH: ~ 6.4

Respiratory or skin sensitisation : Not classified

Germ cell mutagenicity : Not classified

Carcinogenicity : Not classified

Reproductive toxicity : Not classified

Specific target organ toxicity (single exposure) : May cause drowsiness or dizziness.

Specific target organ toxicity (repeated exposure) : Not classified

Aspiration hazard : Not classified

Potential Adverse human health effects and symptoms : Irritating to eyes and skin. Central nervous system depression. High concentration of vapours may induce: headache, nausea, dizziness. Repeated exposure may cause skin dryness or cracking.

## SECTION 12: Ecological information

### 12.1. Toxicity

#### 2-ethoxy-2-methylpropane (637-92-3)

LC50 fish 1	> 974 mg/l 96 hours (Poecilia reticulata)
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EC50 Daphnia 1	110 mg/l 48 hours
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ErC50 (algae)	1100 mg/l 72 hours
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### 12.2. Persistence and degradability

#### 2-ethoxy-2-methylpropane (637-92-3)

Persistence and degradability	Product is biodegradable.
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### 12.3. Bioaccumulative potential

#### 2-ethoxy-2-methylpropane (637-92-3)

Log Pow	1.48 (20 °C)
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Bioaccumulative potential	The product presents low bioaccumulative potential in aquatic organisms.
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### 12.4. Mobility in soil

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### 2-ethoxy-2-methylpropane (637-92-3)

Ecology - soil

High. Mobility in soil.

#### 12.5. Results of PBT and vPvB assessment

No additional information available

#### 12.6. Other adverse effects

No additional information available

### SECTION 13: Disposal considerations

#### 13.1. Waste treatment methods

Regional legislation (waste) : Dispose of this material and its container to hazardous or special waste collection point. Disposal must be done according to official regulations.

Waste disposal recommendations : Dispose of this material and its container to hazardous or special waste collection point. Disposal must be done according to official regulations. Can be deposited in landfills, sent to an incineration or other appropriate means of disposal provided they meet the requirements of local laws.

### SECTION 14: Transport information

#### Classification for ROAD and RAIL transport: ADR / RID

14.1 UN Number : UN1179  
14.2 Proper shipping name : ETHYL BUTYL ETHER  
14.3 Class : 3  
14.4 Packing group : II  
14.5 Environmental hazards : Not considered environmentally hazardous based on available data  
14.6 Special precautions for user : Hazard Identification Number: 33

#### Classification for SEA transport: IMO - IMDG

14.1 UN Number : UN1179  
14.2 Proper shipping name : ETHYL BUTYL ETHER  
14.3 Class : 3  
14.4 Packing group : II  
14.5 Environmental hazards : Not considered marine pollutant based on available data  
14.6 Special precautions for user : No additional information  
14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code:  
Product name : Ethyl tert-butyl ether

#### Classification for AIR transport: IATA - ICAO

14.1 UN Number : UN1179  
14.2 Proper shipping name : Ethyl butyl ether  
14.3 Class : 3  
14.4 Packing group : II  
14.5 Environmental hazards : Not considered environmentally hazardous based on available data

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product therefore it cannot be considered exhaustive. See guidelines of ADR, RID, IMDG and IATA regulations before transporting the product. The transportation organization is responsible for compliance with laws, regulations and rules for the transport of the material.

### SECTION 15: Regulatory information

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

##### 15.1.1. EU-Regulations

No REACH Annex XVII restrictions

Contains no REACH candidate substance

Other regulations, restrictions and prohibition regulations : Compliance with following regulations: Regulation (EC) 1272/2008 as amended. Directive 1999/45/EC as amended. Directive 67/548/EEC as amended. Regulation (EC) 1907/2006 as amended.

##### 15.1.2. National regulations

Regional legislation : Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances) substances.

#### 15.2. Chemical safety assessment

CSA has been established. Exposure scenario is attached.

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### SECTION 16: Other information

Indication of changes:

Exposure scenarios annexed to the safety data sheet.

Sources of Key data : CSR - Chemical Safety Report. MSDS. Data arise from reference works and literature and from information from providers of the used chemicals.

Abbreviations and acronyms : CAS - Chemical Abstracts Service. PEL- Permissible Exposure Level. IARC (International Agency for Research on Cancer). CSR - Chemical Safety Report. CLP - Classification, Labelling and Packaging. EC - European Community. EEC - European Economic Community. MSDS - Material Safety Data Sheet. STEL- Short-Term Exposure Limit . REACH - Registration, Evaluation, Authorisation and Restriction of Chemicals. SDS - Safety Data Sheet . PBT - Persistent, Bioaccumulative and Toxic substance. vPvB - Very Persistent and Very Bioaccumulative. TWA- Time Weighted Average.

Full text of R-, H- and EUH-phrases::

Flam. Liq. 2	flammable liquids Category 2
STOT SE 3	Specific target organ toxicity (single exposure) Category 3
H225	Highly flammable liquid and vapour
H336	May cause drowsiness or dizziness
R11	Highly flammable.
F	Highly flammable

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.*

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### 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.
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##### 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.	
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#### 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.
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##### 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
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##### 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.	

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### 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
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#### 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.	
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### 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
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### 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
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#### 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.	
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### 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
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### 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
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#### 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.	

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### 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
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#### 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
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#### 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
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### 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
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### 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

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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 ... <sup>3</sup> (%):	> 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/m <sup>3</sup> /day Dermal: 6767 mg/kg bodyweight/day					
Contributing scenario	inhalation exposure mg/m <sup>3</sup>	RCR	Dermal exposure mg/kg bodyweight/day	RCR	Sum RCR	Assessment method
PROC1 Duration: Daily amount for wide disperse uses, Without LEV	0.01	0.000	0.34	0.000	0.000	Inhalation.: Used ECETOC TRA model. Dermal: Used ECETOC TRA model.
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.

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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.
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#### 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.
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### 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.	
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#### 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
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#### 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

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### 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
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### 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
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### 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)
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### 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
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### 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
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### 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
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### 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
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### 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
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Conditions and measures related to personal protection, hygiene and health evaluation	Wear a respirator conforming to EN140 with Type A filter or better.
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### 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.
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### 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 ... <sup>3</sup> (%):	> 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 (m <sup>3</sup> /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/m <sup>3</sup> /day Dermal: 6767 mg/kg bodyweight/day					
Contributing scenario	inhalation exposure mg/m <sup>3</sup>	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:	0.006	0.000	0.2	0.000	0.000	Inhalation.: Used ECETOC TRA model.

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daily; 8 hours, Without LEV						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.
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### 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.
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