

SDS Reference

Version 1

Date of amendment -

Registration 01/12/2010

Ecofuel SpA

Safety Data Sheet



CLASSIFIED IN COMPLIANCY WITH CLP/GHS

Product Name	ETHYL TERT-BUTYL ETHER
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1. IDENTIFICATION CODE OF THE SUBSTANCE OR MIXTURE AND THE COMPANY/BUSINESS

1.1 Product identification code

Substance name:	ETHYL TERT-BUTYL ETHER
Synonyms	ETBE
CAS Number	637-92-3
EC Number	211-309-7
Index number	--
Registration Number	01-2119452785-29-0023
Chemical formula	C ₆ H ₁₄ O
Molecular Weight	102.1748

1.2 Identified pertinent use for the substance or mixture and unsuitable uses

COMMON USES: additives for fuel

USES IDENTIFIED IN THE CHEMICAL SAFETY REPORT: general list of applications:

- *Manufacture of the substance (GEST1_I), formulation (GEST2_I), Storage, transport and distribution of ETBE (GEST1A_I)*
- *Industrial use: use of fuel (GEST12_I) (fuelling of cars, boats and motor vehicles),*
- *Professional use: Use as fuel (GEST12_P) (fuelling of cars, boats and motor vehicles at service stations, including the maintenance of petrol pumps)*
- *Consumer use: Use as fuel (GEST12_C) (use of vehicles and petrol motors, fuelling of motors, cars, motorcycles, boats, engines, etc. with petrol supplied from professional users and consumers, engine repair.*

Consult section 16 for a complete list of uses for which an exposure scenario (ES) is envisaged attached to this sheet.

UNSUITABLE USES: pertinent uses are listed above. Other uses are not recommended unless an evaluation has been carried out, prior to this kind of use, that demonstrates that this use will be controlled. The individual registering parties are responsible for each additional assessment.

1.3 Identification of the supplier of the safety data sheet:

Company name	ECOFUEL
Address	Via Maritano, 26
City / Country	San Donato Milanese
Telephone	+39 02 520 56147

E-mail of Responsible Technician: reach@ecofuel.eni.com

1.4 Emergency telephone number:

National Centre for Toxicological Information (24h): (+39) 0382 24444

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

2. HAZARD IDENTIFICATION

Physical-chemical hazards: The substance is an ether, but the oxygen balance (-282) (Lothrop and Handrick) does not indicate explosive potential.

Highly flammable substance. The vapours are heavier than air and form flammable and explosive mixtures with air

Health hazards: the substance has low acute toxicity via oral, dermal and inhalation exposure. The substance is not considered mutagenic, carcinogenic or toxic for reproduction.

Environmental hazards: based on available studies the substance does not require classification in accordance with Directive 67/548/EEC, and EU CLP (Regulation (EC) n° 1272/2008 or in accordance with UN GHS.

2.1 Substance Classification

Directive 67/548/EEC Classification

F; R11 Highly flammable
R 67 The inhalation of vapours may cause drowsiness and dizziness

S9 Store the container in a well-ventilated area
S16 Keep away from flames and sparks - Do not smoke
S33 Take precautionary measures against static discharges

EC1272/2008 Regulation Classification (CLP)

Warning: **HAZARD**

Flamm.Liq.2 H225

STOT SE 3 H336

Acute Tox. 4;, H 332

The list of extended R and H descriptions is provided in section 16

2.2 Label elements



Hazard indications:

H225: Highly flammable liquid and vapours
H336: May cause drowsiness and dizziness

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

Recommended precautions:

Prevention

- P210: Keep away from sources of heat/sparks/naked flames/heated surfaces. – Do not smoke
P243: Take precautions against electrostatic discharges.
P261: Avoid inhalation of powders / fumes / gases / mists / vapours / sprays
P271: Use only outside or in a well-ventilated area

Reaction

- P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
P403+P235: Store in a well-ventilated area. Store in a cool area

Disposal --

2.3 Other hazards

Any substance, in the event of accidents involving pressurised pipes and similar, could be accidentally injected under the skin, sometimes without any apparent surface wounds. In this case the victim must be taken to hospital for suitable treatment as quickly as possible.

The product does not satisfy criteria for PBT or VPvB in accordance with annex XIII of the REACH.

3. COMPOSITION / INFORMATION ON INGREDIENTS

3.1 Substances

The single constituent substance, of organic origin, is Ethyl-t-butyl-ether (>95 % p), CAS 637-92-3 EINECS 211-309-7 index no. --.

Impurities:

Ethanol (CAS 64-17-5; EINECS 200-578-6; Index 603-002-00-5) <5 % p

DSD Classification : F, R11

CLP Classification : Flam. Liq. 2, , H 225

methyl tert-butyl ether (MTBE), CAS 1634-04-4 EINECS 216-653-1 index no. 603-181-00-X. < 2.5 % p

DSD Classification : F, R11; Xi, R38

CLP Classification : Flam. Liq. 2, , Skin.Irrt.; H225-315

Tert-butanol [2-methyl-2-propanol] (CAS 75-65-0; EINECS 200-889-7; Index 603-005-00-1) < 1.0 % p

DSD Classification : F, R11; Xn, R20; Xi, R36/37

CLP Classification : Flam. Liq. 2, Acute Tox. 4.; H 225-332

The substance is manufactured as a fuel additive, using a closed and continuous process, with occasional controlled exposure. The substance is mainly prepared by making isobutene react with ethanol over a catalyst

3.2 Mixtures

n.a.

4. FIRST AID MEASURES

4.1 Description of first aid measures

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

- Inhalation:** In the event of difficulty breathing, remove victim to fresh air and keep in a position comfortable for breathing (715)
If the victim is unconscious (716) and not breathing (790), trained personnel should check the air passage is free and perform artificial respiration (694). If necessary, perform an external cardiac massage and consult a doctor (723). If breathing is difficult, administer oxygen if possible (714).
Do not leave the victim unsupervised (682).
Keep warm and at rest (770).
If the victim is unconscious, keep them on their side in a safety position (724) and consult a doctor immediately (797).
- Skin contact:** Soak contaminated clothes with water before removing them to prevent the risk of static electricity sparks. (688) Remove contaminated clothes and shoes and dispose of them safely (809). Wash the affected part with water and soap (847). Continue for at least 15 minutes (669).
Consult a doctor immediately in the event of irritation, swelling or redness that develops and persists (817).
- Eye contact:** Rinse gently with water for several minutes (814)
Remove any contact lenses if the situation allows this to be done with ease. (808). Continue to rinse (670)
In the event of irritation, blurred vision or persistent swelling, consult a specialist doctor (721)
- Ingestion/inhalation:** If the victim is conscious, rinse the mouth with water without swallowing
Do not induce vomiting to prevent the risk of inhalation. (680)
Do not introduce anything into the mouth of a person in an unconscious state (679).
In the event of vomiting, keep the head low to prevent vomit from entering the lungs (risk of inhalation) (730).
Consult a doctor immediately (797). Do not wait for symptoms to appear (686).

4.2 Main symptoms and acute and delayed effects

- Skin irritant (825).
- Slight irritant for eyes (826) and respiratory system (813).
- Low acute toxicity.
- Effects on the central nervous system are possible at high doses (drowsiness, dizziness).

4.3 Indication of the necessity to consult a doctor immediately and provide special treatments

None

5. FIRE PREVENTION MEASURES

5.1 Extinguishing media

- Small fires: earth or sand, carbon dioxide, alcohol-resistant foam, dry chemical powders.
- Large fires: alcohol-resistant foam, nebulised water, Note: split jet water hoses (nebulised water) should be used only by suitably trained personnel. Other inert gases (as permitted by the standard) (870)

Unsuitable extinguishing media: Do not use water jets directly on the burning product (855), this may cause the fire to spread (881). Avoid the simultaneous use of foam and water on the same surface because water destroys foam (873).

5.2 Special hazards deriving from the substance or mixture

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

Incomplete combustion could generate a complex mixture of solid and liquid particles dispersed in the air and gases, including carbon monoxide (867), unidentified organic and inorganic compounds (886) (alcohol, aldehydes).

Specific hazards during fire extinction:

The colourless vapour is heavier than air and spreads out along the ground. It may accumulate in closed spaces and areas of low pressure. Remote ignition may occur (877).

Move containers away from the fire area, if this is possible without exposure to danger.

Use jets of water to cool surfaces and containers exposed to flames or heat

Immediately move away from the tank in the event of safety valve cut-in, or in the event of a clear change in colour of the tank.

5.3 Recommendations for fire officers

In the event of large fires or fires in confined or poorly-ventilated spaces, wear flameproof clothing and an autonomous respirator with a full mask that works under positive pressure (864).

5.3 Recommendations for fire officers

In the event of large fires or fires in confined or poorly-ventilated spaces, wear flameproof clothing and an autonomous respirator with a full mask that works under positive pressure (864).

Further information:

Do not dispose the residual product, resulting material and waters used to extinguish fires. Collect and treat this material in accordance with applicable legislation

6. MEASURES IN THE EVENT OF ACCIDENTAL LEAKS

6.1 Personal safety precautions, protective devices and emergency procedures

If safety conditions allow, arrest or contain the leak at the source (1006). Avoid direct contact with released material (903). Stay upwind (1003). In the event of large spills, advise residents in downwind areas (956). Remove any personnel not directly involved from the spill area. Advise emergency forces (968). Except in the case of small spills (925), the feasibility of operations should always be assessed and approved, if possible, by qualified and competent personnel responsible for managing the emergency (1007). Eliminate all sources of ignition if safety conditions allow (e.g.: electricity, sparks, fires, flare stacks) (920). Use only non sparking tools (1152) If required, report the event to the relevant bodies in accordance with applicable legislation (949).

Small spills (995): Traditional antistatic work garments should generally be appropriate (983).

Large spills: garments providing complete protection, resistant to chemical agents and made from antistatic material (973). Work gloves that provide suitable resistance to chemical agents. Gloves made from PVA (polyvinyl alcohol) are not waterproof and are unsuitable for emergency use (933). Protective helmet (1030). Antistatic and non-slip safety shoes or boots (899) resistant to chemical agents. Protective glasses or protective devices to cover the face if splashing or eye contact is possible or likely (934). Respiratory protection: a half or full mask equipped with a filter(s) for organic vapours or an autonomous respirator may be used based on the entity of the spill and foreseeable level of exposure (895). In the event that the situation cannot be fully assessed or if there is a risk of a lack of oxygen, use an autonomous respirator exclusively (951).

6.2 Environmental precautions

Prevent leaks and the contamination of soil/water caused by any leaks (S4)

Prevent the substance from entering the sewage system, rivers or other bodies of water (985)

The substance may pollute groundwater, giving water an unpleasant taste even in small concentrations.

If there is a risk of large spills, an emergency response plan must be prepared

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

6.3 Methods and materials for containment and site clean up

Spills onto soil: If necessary, stem the product using dry earth, sand or other non-flammable material (940). Large spills can be covered, with care, with alcohol resistant foam, if available, in order to prevent the risk of fire (970). Do not use direct jets (918). Inside buildings or confined spaces, ensure appropriate ventilation is available (1022). Absorb the spilt product using non-flammable material (896). If necessary, store the contaminated material for later safe disposal, use suitable containers only (watertight, sealed, impermeable, earthed) (939). In the event of soil contamination, remove the contaminated soil and treat in accordance with local legislation (959).

Spills in water: The product is soluble in water and the possibility of intervention may be limited.

If possible, contain larger spills in water using floating barriers or other mechanical devices (948) only if it is strictly necessary and if the risk of fire or explosion can be adequately controlled, otherwise leave the product to evaporate and disperse naturally (978). If possible, collect the product and contaminated material using mechanical devices and store/dispose in compliance with applicable legislation (945).

The recommended measures are based on the most likely spill scenarios for this product. Local conditions (wind, air temperature, direction and speed of waves and currents) can, however, significantly influence the choice of action to be implemented (990). Consult local experts where necessary. (928) Local legislation may set out or limit the actions to be implemented (981).

6.4 Reference to other sections

None

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

7.1.1 Protective measures

Risk of explosive mixture of vapours and air (1120). Make sure that all requirements concerning explosive atmospheres and structures that store and handle flammable products are correctly observed (1079).

Adopt precautionary measures against static discharges (1134). Ensure that the container, tanks and storage and transfer equipment are earthed (1087). Only use non sparking equipment (1152) The vapour is heavier than air (1137). Take particular care over accumulation in wells and confined spaces (1051). Keep away from sources of heat/sparks/naked flames/heated surfaces (1097). Do not smoke.

Use only loading from below for cisterns, in compliance with the relevant European legislation (1151). Do not use compressed air during filling, draining or handling operations (1073). Avoid contact with the skin and eyes (1041). Do not ingest (1072). Do not breathe vapours (1070)

7.1.2 Instructions for workplace hygiene

Do not breathe mists/vapours/aerosol sprays (P260). Avoid contact with the skin (1042). Do not eat, drink or smoke while using the product (1041). Carefully wash hands after handling (1156). Do not reuse contaminated garments.

7.2 Conditions for safe storage, including any incompatibilities

The structure of the storage area, the specification of the tanks, the equipment and the operating procedures must comply with applicable European, national or local legislation (1127). Storage plants must be equipped with dedicated systems to prevent soil and water contamination in the event of leaks or spills (1129). Activities involving the cleaning, inspection and internal maintenance of storage tanks must be carried out by qualified and suitably equipped personnel, as set out by national or local legislation or company rules (1054). Before accessing the storage tanks and

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

beginning any type of operation in a confined space, carry out a clean up, check the atmosphere and check the oxygen content and degree of flammability (1049).

Keep separate from oxidising agents (1133).

Suitable materials: use carbon steel, stainless steel or another approved material that is suitable for the product for the construction of containers or inner linings (1083). Some synthetic materials, Viton and Flourel may not be suitable for containers or inner linings based on the specifications of the material and planned use (1125). Check the compatibility of materials with the manufacturer (1055) based on conditions of use.

If the product is supplied in containers (1094), keep it in the original containers only or in containers suitable for the type of product (1099). Store in a well-ventilated area (1131).

Keep containers securely closed and correctly labelled (1098), facing up

Empty containers may contain flammable product residues. (1078) Do not weld, braze, drill, cut or incinerate empty containers unless they have been suitably cleaned (1075).

7.3 Specific end uses

See attached exposure scenarios

8. EXPOSURE CONTROL / PERSONAL PROTECTION

8.1 Control parameters

Limit exposure values (substance):

ACGIH 2010:

- TLV®-TWA: 5 ppm

DNEL (Derived No Effect Level)

Exposure methods	DNEL Workers				DNEL general population			
	Chronic, local effects	Chronic, systemic effects	Acute, local effects	Acute, systemic effects	Chronic, local effects	Chronic, systemic effects	Acute, local effects	Acute, systemic effects
oral	n.a.	n.a.	n.a.	n.a.	n.a.	12.5 mg/kg bw /day	n.a.	n.q.
dermal	n.q.	6767 mg/kg bw/day	n.q.	n.q.	n.q.	4060 mg/kg bw/day	n.q.	n.q.
inhalation	105 mg/m ³ local irritant effects on the respiratory tract	352 mg/m ³	n.q.	2800 mg/m ³ neurotoxic	63 mg/m ³ local irritant effects on the respiratory tract	105 mg/m ³	n.a.	1680 mg/m ³

n.q. not quantifiable

DMEL (Derived Minimum Effect Level)

For a discussion consult the RTC.

PNEC(S) (Predicted No Effect Concentration)

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

For a discussion consult the RTC.

8.2 Exposure controls

8.2.1 Suitable technical controls

Minimise exposure to mists/vapours/aerosol sprays. Before accessing the storage tanks and beginning any type of operation in a confined space, carry out a clean up, check the atmosphere and check the oxygen content and degree of flammability (1049).

8.2.2 Personal protection measures

(a) Protection for eyes/ face:

In the absence of containment systems and in the event of eye/face contact hazard, wear protection for the head and face (visor and/or protective glasses (EN 166) (1185)

(b) Skin protection:

i) Hand protection

In the absence of containment systems and in the event of possible skin contact, use long-sleeved gloves that are resistant to chemical agents and fleeced inside. Materials presumed to be suitable: Nitrile or Multilayer (e.g. neoprene/PVA), with a chemical agent protection index of at least 5 (permeation time > 240 minutes). Use the gloves in accordance with the conditions and limits set out by the manufacturer. If required, refer to standard UNI EN 374.

Gloves must undergo periodical inspection and should be replaced if worn, perforated or contaminated (1174).ii) Other

In the event of product handling, use antistatic work clothing with long sleeves, in accordance with the risks connected with the work area classification. If required, refer to standards UNI EN 465-466-467.

In the event of the contamination of garments, replace and clean them immediately.

(c) Respiratory protection:

In the absence of containment systems:

Use approved protective devices for the respiratory passages: full masks equipped with AX type filter cartridges (brown for organic vapours with low boiling point). For specifications refer to MD 2/5/2001

In confined spaces:

Use approved protective devices for the respiratory passages: full masks equipped with AX type filter cartridges (brown for organic vapours with low boiling point). If it is not possible to determine or safely estimate exposure levels or if there is a risk of a lack of oxygen, use an autonomous respirator exclusively (EN 529) (1183). For specifications refer to MD 2/5/2001

(d) Heat hazards :

Not applicable



8.2.3 Environmental exposure controls

Do not release into the environment (1046). Storage plants must be equipped with dedicated systems to prevent soil and water contamination in the event of leaks or spills (1129).

On-site treatment of waste water is required (TCR13).

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

Prevent the release of undissolved substances or recover them from the waste water. (TRC14)

Do not distribute the mud generated during the treatment of industrial waste over natural terrain (OMS2).

The mud generated during the treatment of industrial waters must be incinerated, contained or treated (OMS3). For further information consult the attached exposure scenarios

8.3 Other

The attached exposure scenarios include details of operating conditions and management measures to control health and environmental hazards associated with identified uses for the substance, associated with the hazard specifications given in section 2.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) <i>Appearance:</i>	liquid
b) <i>Odour:</i>	Terpenic
c) <i>Olfactory threshold:</i>	not/avail.
d) <i>pH:</i>	not/avail.
e) <i>Melting point/freezing point:</i>	-94° C
f) <i>Initial boiling point and boiling range:</i>	73.1°C
g) <i>Flash-point:</i>	-19°C
h) <i>Evaporation rate:</i>	not/avail.
i) <i>Flammability (solids, gases):</i>	the substance is highly flammable
j) <i>Upper/lower limits of flammability or explosivity:</i>	not/avail.
k) <i>Vapour pressure:</i>	17kPa at 25°C
l) <i>Vapour density:</i>	not/avail.
m) <i>Relative density:</i>	0.75 at 20°C
n) <i>Solubility:</i>	solubility in water is 16400 mg/l at 20°C
o) <i>N-octanol/water partition coefficient:</i>	1.48 at 20°C
p) <i>Auto-ignition temperature:</i>	392°C
q) <i>Decomposition temperature:</i>	not/avail.
r) <i>Viscosity:</i>	0.53 mm ² /s (static) at 20°C and 0.47 mm ² /s (static) at 40°C
s) <i>Explosive properties:</i>	the substance is not explosive
t) <i>Oxidising properties:</i>	the substance is not oxidising

9.2 Other information

Not present

10. STABILITY AND REACTIVITY

10.1 Reactivity

The substance does not present further hazards connected with reactivity with respect to those given below

10.2 Chemical stability

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

This substance is stable in relation to its intrinsic properties. Because ETBE is an ether, the molecular structure displays only a potential reactivity. Nevertheless, the oxygen balance of ETBE is -282, where only an oxygen balance greater than -200 indicates the presence of potential explosive properties. Therefore, explosive properties are not anticipated.

10.3 Possibility of hazardous reactions

Contact with strong oxidants (such as peroxides and chromates) may generate a fire hazard. (612).

A mixture with nitrates or other strong oxidants (such as chlorates, perchlorates and liquid oxygen) may generate an explosive mass (609). Sensitivity to heat, friction and shock cannot be assessed in advance (616).

Contact with strong acids may break down the material and generate highly flammable isobutylene.

10.4 Conditions to be avoided

Keep separate from oxidising agents (1133).

Keep away from sources of heat/sparks/naked flames/heated surfaces (1097). Do not smoke

Prevent the formation of electrostatic charges

10.5 Incompatible materials

Strong oxidants, strong acids

10.6 Hazardous products of decomposition

None

11. TOXICOLOGICAL INFORMATION

11.1 Toxicokinetics, metabolism and distribution

Method	Result	Remarks	Source
RAT: male/female Inhalation: vapours Exposure time: 4 hours Dose/conc.: 4 and 40 ppm	Toxicokinetic parameters: half life: 0.4 ± 0.0 (4 ppm) (Test No.: #1) and 0.8 ± 0.2 (40 ppm) (Test No.: #2) Identification of metabolites: TBA, 2-methyl-1,2-propanediol, and 2-hydroxyisobutyrate excreted in urine.	Key study (study of greatest relevance) Reliable with restrictions	Dekant W, Bernauer U, Rosner E, Amberg A (2001)
Dermal absorption QSAR	Absorption rate: approx. 0.3% (permeability coefficient $K_p=0.0063$ cm/hour)	Key study (study of greatest relevance) Reliable with restrictions	ten Berge, W. (2009)
Inhalation absorption Man: male exposed to ETBE vapours (0.5-25 and 50 ppm) for 2 hours	The capture of the respiratory passages was 32-34% of ETBE and respiratory exhalation was 45-50% of ETBE absorbed.	Key study (study of greatest relevance) Reliable with restrictions	Nihlén A, Löf A, Johanson G (1998a)

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

Man: male/female Exposure to inhalation vapours	The maximum concentration of ETBE in the blood following exposure at 4 and 40 ppm was $1.3 \pm 0.7 \mu\text{m}$ (at half time $1.1 \pm 0.2 \text{ h}$) and $12.1 \pm 4.0 \mu\text{m}$ (at half time of first session = $1.1 \pm 0.1 \text{ h}$; at half time of second session = $6.2 \pm 3.3 \text{ ore}$), respectively. The maximum concentration of TBA was $1.8 \pm 0.2 \mu\text{m}$ (at half time $8.2 \pm 2.2 \text{ h}$) and $13.9 \pm 2.2 \mu\text{m}$ (at half time $9.8 \pm 1.4 \text{ h}$).	Key study (study of greatest relevance) Reliable with restrictions	Dekant W, Bernauer U, Rosner E, Amberg A (2001)
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11.2 Toxicological information

a) Acute toxicity:

Oral exposure

ETBE displays low levels of acute toxicity via oral and dermal exposure in humans and in animals tests.

Data on a limited number of humans shows that exposure to ETBE vapours from 25 to 50 ppm for 2 hours is associated with reduced pulmonary function.

Below is a summary of the most representative studies in the Registration Dossier

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

Method	Result	Remarks	Source
RAT: male/female ORAL (gavage) OECD Guideline 401 (Acute Oral Toxicity)	DL50>2003 mg/kg (male/female)	Key study (study of greatest relevance) Reliable without restriction	Pharmakon Europe (1994a)

Inhalation exposure

Below is a summary of the most representative studies in the Registration Dossier

Method	Result	Remarks	Source
RAT: male/female Inhalation: vapours OECD Guideline 403 (Acute inhalation toxicity) or equivalent methods	CL50 (4 hours): 5.88 mg/L (male/female)	Key study (study of greatest relevance) Reliable without restriction	IIT Research Institute (1989a)

Skin exposure

Below is a summary of the most representative studies in the Registration Dossier.

Method	Result	Remarks	Source
RAT: male/female OECD Guideline 402 (Acute dermal toxicity)	DL50>2000 mg/kg (male/female)	Key study (study of greatest relevance) Reliable with restrictions	IIT Research Institute (1989a)

b) Repeated dose toxicity

Oral and dermal

In compliance with column 2 of REACH, annex IX, tests must be carried out using the most suitable administration method. Inhalation tests are appropriate if human exposure is likely to occur via inhalation contact. Inhalation exposure is the main type of exposure to ETBE and sub chronic studies on inhalation are available.

Inhalation exposure

Method	Result	Remarks	Source
RAT: male/female Filtered air Exposure: 90 days (6h/day for 5 days/week) EPA OTS 798.2450	NOAEC: 500 ppm (male/female)	Key study (study of greatest relevance) Reliable without restriction	CIIT (1996a) Medinsky, MA, Wolf, DC, Cattley, RC, Wong, B, Janszen, DB, Farris (1999a)

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

RAT: male/female Filtered air Exposure: 90 days (6h/day for 5 days/week) EPA OTS 798.2450	NOAEC: 5000 ppm (male/female)	Key study (study of greatest relevance) Reliable without restriction	CIIT (1996b) Dorman, DC, Struve, MF, Wong, BA, Morgan, KT, Janszen, DB, Gross, (1997)
RAT: male/female Filtered air Exposure: 90 days (6h/day for 5 days/week) EPA OTS 798.2450	NOAEC: 5000 ppm (male/female)	Key study (study of greatest relevance) Reliable without restriction	CIIT (1996c) Medinsky, MA, Wolf, DC, Cattley, RC, Wong, B, Janszen, DB, Farris (1999b)

c) Skin irritation

The potential for skin irritation of ETBE samples was tested in a number of studies generally conducted on rabbits. Below is a summary of the most representative studies in the CSR.

Method	Result	Remarks	Source
RABBIT Semi occlusive coverage OECD Guideline 404 (Acute dermal irritation/corrosion).	Erythema index = 0.67 out of 4 (24+48+72h) completely reversible within 7 days Edema index = 0.11 out of 4 (24+48+72h) completely reversible within 48 hours	Key study (study of greatest relevance) Reliable without restriction	Pharmakon Europe (1994b)

d) Eye irritation

The potential for eye irritation of samples belonging to ETBE was tested in a large number of studies generally conducted on rabbits.

Below is a summary of the most representative studies in the Registration Dossier.

Method	Result	Remarks	Source
RABBIT OECD Guideline 405 (Acute eye irritation/corrosion) EU method B.5	Index on cornea= 0.22 out of 4 (24+48+72h) completely reversible within 48h Iris index = 0.67 out of 2 (24+48+72h) completely reversible within 7 days Index on conjunctiva = 0.78 out of 4 (24+48+72h) completely reversible within 7 days Chemosis index = 0.33 out of 4 (24+48+72h) completely reversible within 72h	Key study (study of greatest relevance) Reliable without restriction	Pharmakon Europe (1994b)

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

e) Respiratory or skin sensitisation

Respiratory sensitisation

There is no evidence of effects on the respiratory tract following repeated inhalation in animals.

Skin sensitisation

The results obtained from available studies indicate the absence of potential skin sensitisation.

Below is a summary of the most representative studies in the Registration Dossier

Method	Result	Remarks	Source
CAVIA males OECD Guideline 406 EU method B.6 EPA OTS 798.4100	Non sensitising	Key study (study of greatest relevance) Reliable without restriction	Pharmakon Europe (1994b)

f) Germ cell mutagenicity

All available data shows that ETBE is non-mutagen, therefore in accordance with directive 67/548/EEC and EU CLP Regulation (EC) N° 1282/2008 mutagenicity classification is not required.

Below is a summary of the most representative studies in the CSR.

Method	Result	Remarks	Source
Ames test: bacteria reverse mutation test Salmonella typhimurium, other: TA1535, TA1537, TA1538, TA98, TA100 OECD Guideline 471 EU Method B.13/14 EPA OPPTS 870.5265	Results: negative for Salmonella cytotoxicity: no	Key study (study of greatest relevance) Reliable without restriction	Pharmakon Europe (1994b)
Paper on genetic mutation in mammalian cells Hamster cells OECD Guideline 476 or equivalent methods	Results: negative for cytotoxicity in hamster ovarian cells: no	Key study (study of greatest relevance) Reliable without restriction	Bushy Run Research Center (1995a)
Chromosome abnormality Hamster ovarian cells OECD Guideline 473 or equivalent methods	Results: negative for cytotoxicity in hamster ovarian cells: no	Key study (study of greatest relevance) Reliable without restriction	Bushy Run Research Center (1995a)
Chromosome abnormality Male and female mice OECD Guideline 474 or equivalent methods	Results: genotoxicity: negative toxicity: yes	Key study (study of greatest relevance) Reliable without restriction	Bushy Run Research Center (1995a)

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

g) Carcinogenicity

Below is a summary of the most representative studies from the CSR.

Oral

No scientifically valid data is available.

Inhalation

No data is available

Dermal

No data is available.

h) Reproductive toxicity

Effects on fertility

Below is a summary of the most representative studies from the CSR.

Method	Result	Remarks	Source
RAT (Sprague-Dawley) (male/female) No particular guideline was followed.	NOAEL (toxicity in adults): 250 mg/kg bw/day NOAEL (reproduction) : 1000 mg/kg bw/day	Key study (study of greatest relevance) Reliable without restriction	CIT, France (2004a)

Development/teratogenesis toxicity:

Below is a summary of the most representative studies from the CSR.

Method	Result	Remarks	Source
RAT OECD Guideline 414 EPA OPPTS 870.3700 EU Method B.31	NOAEC (maternal toxicity): 500 mg/Kg bw/day NOAEL (toxicity in development): 1000 mg/Kg bw/day	Key study (study of greatest relevance) Reliable without restriction	CIT, France (2004a)

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Below is a summary of the most representative studies in the Registration Dossier.

Endpoint	Result	Remarks	References
Aquatic toxicity			
Invertebrates - Short term Daphnia Magna Fresh water OECD Guideline 202	EC50 (48 h): 110 mg/L	Key study	SafePharm Laboratories (2003a)
Invertebrates - Short term Mysidopsis bahia (new name:		Key study	

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

Americamysis bahia) Salt water EPA OTS 797.1930	LC50 (96 h): 37 mg/L		T.R. Wilbury Laboratories, Inc. (1994 b)
Invertebrates - Long term Daphnia Magna Fresh water EPA OPPTS 850.1300	NOEC (21 d): 51 mg/L LOEC (21 d): 100 mg/L	Key study	Wildlife International Ltd. (1999g)
Invertebrates - Long term Americamysis bahia (reported as Mysidopsis bahia) Brackish water EPA OPPTS 850.1350	NOEC (28 d): 3.39mg/L	Key study	T.R. Wilbury Laboratories, Inc. (2004)
Algae Pseudokirchneriella subcapitata (reported as Selenastrum capricornutum) Fresh water OECD Guideline 201	EC50 (72 h): 1100 mg/L TOC based on biomass NOEC (72 h): 7.5 mg/L TOC based on growth	Key study	SafePharm Laboratories (2003b)

Fish - Short term Poecilia reticulata Fresh water OECD Guideline 203	LC50 (96 h)<974.1 mg/L TOC	Key study	Slovnaft VÚRUP, a.s. (2005b)
Fish - Short term Menidia beryllina Salt water OECD Guideline 203 Pimephales promelas Fresh water ASTM E1241-92	LC50 (96 h): 574 mg/L NOEC (31 d): 299 mg/L NOEC (31 d): 299 mg/L	Key study Read-across from MTBE Key study Read-across from MTBE	BenKinney MT, Barbieri JF, Gross JS & Naro PA (1994a) ENSR (1999)

Microbiological activity in mud			
Invertebrates Pseudomonas putida Fresh water ISO 10712	NOEC (16 h): 78 mg/L t EC10 (16 h): 25 mg/L EC50 (16 h): 510 mg/L	Key study	SafePharm Laboratories (2003c)

12.2 Persistence

and

degradability

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

Abiotic degradability

Hydrolysis: in accordance with section 2 of REACH annex XI, the study must not be carried out based on the chemical physical properties of the TAME and the properties of other aliphatic ethers. ETBE does not appear to have hydrolysis in natural waters under normal environmental conditions (pH 4-10).

Photolysis in air: the half life of ETBE in air is 3-12 days based on environmental conditions. At a constant rate of degradation and a constant concentration of OH radicals the half life has been calculated as 4.72 days (Bennet and Kerr, 1990).

Photolysis in water: direct photolysis is not an important process for ETBE removal in water because aliphatic ethers do not absorb light at wavelengths of > 290 nm, which are responsible for this process. The UV spectrum of ETBE has a t max of 289 nm, indicating a low potential for direct photolysis in water.

Method	Result	Remarks	References
Biodegradability Activated, industrial mud OECD Guideline 301 D (Ready Biodegradability: Closed Bottle Test)	% degradation 6.6 after 7 days (consumption of O ₂)	Key study Reliable with restrictions	Slovnaft VÚRUP, a.s. (2005a)
Microbe community from soil polluted with diesel Monitoring of degradation using oxygen sampling	% degradation 100 after 30h	Key study Reliable with restrictions	Kharoune M, Kharoune L, Lebault J-M, Paus A (2002)

Biodegradation in soil

Method	Result	Remarks	References
Laboratory test Soil type 1. Organic 2. Sandy clay	Half life (DT50) ◆ 89.5 days (1) ◆ 82.4 days (2) % degradation ◆ 66 after 151 days ◆ 71 after 151 days	Key study Reliable with restrictions	Yuan, H (2006)

12.3 Bioaccumulation potential

Bioconcentration factors in the body (BCF) are not available. The potential for bioaccumulation is based on the Know log 1.48. Based on these results ETBE is not predicted to have potential for bioaccumulation.

12.4 Mobility

in

soil

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

KOC Absorption coefficient: 19.9 l/kg (log value = 1.30) (calculated)

12.5 Results of PBT and vPvB assessment

Comparison with criteria set out in annex XIII of REACH regulation

By carrying out a comparison with the criteria in annex XIII, a PBT status assessment of ETBE was made using available data. Available information indicates that ETBE does not satisfy PBT selection criteria, as indicated in annex XIII of directive 2006/121/EC.

12.6 Other adverse effects

Release into the environment may lead to the contamination of environmental matrices (air, soil, subsoil, surface water and groundwater). Use in accordance with good working practices, avoiding release of the product into the environment

13. CONSIDERATIONS ON DISPOSAL

13.1 Waste treatment methods

Do not dump on soil or in sewage systems, wells or water courses.

For the disposal of waste deriving from the product, including empty containers that have not been cleaned, refer to Lgs.D. 152/06 and s.m.s. European Catalogue Code on Waste: 13 03 05 (Ref: 2001/118/EC and Environment Min. Dir. 9/04/2002) (the code given is only a general indication, based on the original composition of the product and its envisaged uses. The holder is responsible for choosing the most suitable code based on the effective use of the product, any alterations or contaminations.

Disposal of containers: Not or dispose of containers in the environment. Dispose in compliancy with applicable local legislation.

Do not pierce, cut, grind, weld, braze, burn or incinerate empty containers or drums that have not been cleaned.

14. TRANSPORT INFORMATION

14.1 UN number

1179

14.2 UN shipment name

ETHYL-BUTYL ETHER

14.3 Transport hazard classes:

Road/rail transport (ADR/RID/ADN):	Class 3, Flamm liquid (KEMLER 33)
Sea transport (IMDG):	Class 3, Flamm liquid (F-E, S-D)
Air transport (IATA):	Class 3, Flamm liquid

14.4 Packaging groups:

II, Label 3

14.5 Environmental hazards:

Substance not hazardous to the environment in accordance with ADR, RID, ADN and IMDG.

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

14.6 Special precautions for users (transport operations):

Loading onto cistern carriages on road or rail (CS511): Ensure that the transfer of the material takes place under containment or extraction ventilation conditions (E66). Wear protective gloves against chemical agents (compliant with standard EN374), together with a basic training course (PPE16).

CS510 Loading and unloading to/from ships/barges (CS510): Transfer using closed lines (E52). Empty the transfer lines before decoupling (E39). Keep dregs in watertight containers for subsequent disposal or recycling (ENTV4). Wear protective gloves against chemical agents (compliant with standard EN374), together with a basic training course (PPE16).

14.7 Transport of bulk material in accordance with annex II of MARPOL 73/78 and the IBC code

If you intend to carry out bulk transport adhere to annex II MARPOL 73/78 and the IBC code where applicable.

14.8 Other

Tunnel restriction code (ADR): D/E

15. INFORMATION ON REGULATIONS

15.1 Standards and legislation on health, safety and environment specific to the substance or mixture

Authorisation in accordance with REACH regulations (EC regulation no. 1907/2006 and s.m.s.): product not present in the list of Substances of Very High Concern (SVHC) candidate for authorisation

Use restrictions in accordance with REACH regulations (EC regulation no. 1907/2006 and s.m.s.): Substance subject to restrictions in accordance with Title VIII (Annex XVII, Appendix 2, point 28)

Other EU standards and national implementations:

Seveso Category (Dir. 96/82/EC and Dir. 105/2003/EC and Lgs D. 334/99 and s.m.s.): annex I part 2 group 7b
 Dangerous chemical agent in accordance with Dir. 98/24/EC and Heading I, Title IX of Lgs D. 81/08 and s.m.s.

15.2 Chemical safety assessment

A chemical safety assessment was carried out

16. OTHER INFORMATION

List of relevant phrases:

These phrases are shown for information and do not necessarily correspond with the product classification

R Phrases

R11: Highly flammable

R38: Skin irritant

R67: The inhalation of vapours may cause drowsiness and dizziness

Hazard indications

H225: Highly flammable liquid and vapours

H315: Causes skin irritation

H336: may cause drowsiness or dizziness

Instructions for training:

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

Provide suitable training for workers potentially exposed to this substance based on the content of this safety sheet

Main bibliographical references and sources:

Registration Dossier and CSR (Chemical safety report)

Key to abbreviations and acronyms:

ACGIH	=	American Conference of Governmental Industrial Hygienists
CSR	=	Chemical Safety Report
DNEL	=	Derived No Effect Level
DMEL	=	Derived Minimum Effect Level
EC50	=	Effective concentration, 50%
EL50	=	Effective load, 50 %
EPA	=	Environmental Protection Agency
IC50	=	Inhibition concentration, 50%
LC50	=	Lethal concentration, 50%
LD50	=	Lethal dose, 50%
LL50	=	Lethal load, 50%
LOAEL	=	Low Observed Adverse Effects Level.
NOEL	=	No Observed Effects Level.
NOAEL	=	No Observed Adverse Effects Level.
OECD	=	Organisation for Economic Co-operation and Development
PNEC	=	Predicted No Effect Concentration
n.a.	=	Not applicable
not/avail.	=	Not available
PBT	=	Persistent, Bioaccumulative and Toxic substance
CNS	=	Central nervous system
STOT	=	Specific Target Organ Toxicity
(STOT) RE	=	Repeated exposure
(STOT) SE	=	Single exposure
TLV* [®] TWA	=	Threshold limit value - Time weighted average
TLV* [®] STEL	=	Threshold Limit Value - Short Term Exposure Limit
UVCB	=	Unknown, of Variable Composition, or of Biological Origin
vPvB	=	very Persistent and very Bioaccumulable
WAF	=	Water Accomodated Fraction

For further information:

below are the use descriptions (from the CSR) associated with the uses identified in section 1.2

Name of identified use	Sector	Sector of use SU	Process categories PROC	Environmental release categories ERC
01- Manufacture of the substance (GEST1_I)	Industrial (G26)	3	1, 2, 3., 4, 8a, 8b. 15	1
02- Formulation and (re)packaging of substances and mixtures (GEST2_I) Industrial (G26)	Industrial	3	1, 2, 3, 4, 5, 8a, 8b, 9, 15	2

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

Name of identified use	Sector	Sector of use SU	Process categories PROC	Environmental release categories ERC
03- Distribution of ETBE and petrol containing ETBE (GEST1A_I) Industrial (G26)	Industrial	3	1, 2, 3, 4, 8a, 8b, 9, 15	1, 2
04- Use as fuel (GEST12_I): Industrial (G26)	Industrial	3	1, 2, 3., 8a, 8b. 16	ESVOC3 SpERC
05- Use as fuel (GEST12_I) Professional (G27)	Professional	22	1, 2, 3., 8a, 8b. 9, 16	ESVOC30 SpERC
06- Use as fuel (GEST12_I) Consumer (G27)	Consumer	21	8d	ESVOC30 SpERC

Compilation date 12/12/2010

Date of Amendment: 12/12/2010

Reason for amendment Update in accordance with Annex I of Regulation UE453/2010

Sheet compliant with EC regulation no. 1907/2006 and s.m.s.

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

ANNEX

EXPOSURE SCENARIOS

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

Contents

1. Manufacture of ETBE	3
2. Formulation of ETBE	3
3. Distribution of ETBE	3
4. Use of ETBE in fuels – Industrial sector	3
5. Use of ETBE in fuels – Professional sector	3
6. Use of ETBE in fuels – Consumers	3

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

1. Manufacture of ETBE

Section 1	
Title	
Manufacture of ETBE – CAS RN 637-92-3	
Use descriptions	
Use sector	Industrial (SU3)
Process categories	PROC1, PROC2, PROC3, PROC4, PROC8A, PROC8B, PROC15
Processes, tasks, activities covered	
Manufacture of ETBE. Includes recycling/recovery operations, transport of material, storage, sampling, associated laboratory work, maintenance and loading operations (including those for ships/barges, cistern carriages on road or rail, and containers for loose goods).	
Section 2 Operating conditions and risk management measures	
Section 2.1 Control of worker exposure	
Product specifications	
Physical state of product	Liquid, vapour pressure > 10 kPa under standard conditions (OC5).
Concentration of substance in product	Covers a percentage of substance in the product up to 100% (if not otherwise indicated) (G13).
Quantity used	Not applicable.
Frequency and duration of use/exposure	Covers a daily exposure of up to 8 hours (if not otherwise indicated) (G2).
Human factors not influenced by risk management	Not applicable.
Other operating conditions that affect exposure	Assumes a use of the product at a temperature no greater than 20° C with respect to ambient temperature, unless specified otherwise (G15). Assumes the application of a basic standard of workplace hygiene (G1).
Exposure scenarios	
Specific measures for risk management and operating conditions	
General exposure (closed systems) (CS15)	No specific measures have been identified (E118).
General exposure (closed systems) (CS15); with sampling (CS56).	Ensure that the operation is carried out outside (E69). Do not carry out activities that include the possibility of exposure of more than 4 hours (OC28). or (G9) Wear a full mask (compliant with standard EN140) equipped with type A filter or superior (PPE22).
General exposure (closed systems) (CS15); Use in discontinuous processes under containment (CS37); with sampling (CS56).	Provide extraction ventilation at emission points (E54).
General exposure (open systems) (CS16). Discontinuous process (CS55). With sampling (CS56). Filling/preparation of equipment from drums or containers (CS45).	Ensure that the transfer of the material takes place under containment or extraction ventilation conditions (E66).
Sampling during process (CS2); dedicated structure (CS81)	Provide extraction ventilation at emission points (E54).
Laboratory activity (CS36); Cleaning (CS47).	Handle under a chemical hood or with extraction ventilation (E83).

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

Open loading/unloading of loose product (CS503); non-dedicated structure (CS82).	Do not carry out activities that include the possibility of exposure of more than 4 hours (OC28); or (G9) Wear a full mask (compliant with standard EN140) equipped with type A filter or superior (PPE22).
Closed loading/unloading of loose product (CS501) dedicated structure (CS81)	Do not carry out activities that include the possibility of exposure of more than 4 hours (OC28); or (G9) Wear a full mask (compliant with standard EN140) equipped with type A filter or superior (PPE22).
Cleaning and maintenance of equipment (CS39); non-dedicated structure (CS82).	Drain and bleed the system before opening or performing maintenance on equipment (E55). Do not carry out activities that provide the possibility of exposure of more than 1 hour (OC27). Wear a full mask (compliant with standard EN140) equipped with type A filter or superior (PPE22).
Storage (CS67) General exposure (closed systems) (CS15)	No specific measures have been identified (E118).
Storage (CS67) General exposure (closed systems) (CS15) with sampling (CS56)	Provide an extraction ventilation system at all material transfer points and other openings (E82). Do not carry out activities that include the possibility of exposure of more than 4 hours (OC28); or (G9) Wear a full mask (compliant with standard EN140) equipped with type A filter or superior (PPE22).

Section 2.2 Control of environmental exposure

Product specifications

The substance is formed of a single chemical entity (PrC1); Prevalently hydrophobic (PrC4a); Readily biodegradable (PrC5a).

Operating conditions

For outside use (OOC1).

Quantity used

Volume produced in EU (tons/year)	3,004,450
Fraction of EU tonnage used locally (A1)	0.226
Regional tonnage (tons/year) (A2)	679,000
Fraction of regional tonnage used locally (A3)	0.4
Average daily tonnage at site (kg/per day)	905,333
Annual tonnage at site (tons/year)	271,600

Frequency and duration of use

Continuous release (FD2)	
Emission Days (days/year) (FD4)	300

Other operating conditions that affect environmental exposure

Use in closed systems, in dry or wet processes.

Fraction released into air by process	1.00e-3
Fraction released into waste water by process	3.00e-4
Fraction released into soil by process (regional only)	1.00e-4

RMMs

Process (source) measures and technical conditions to prevent releases

The procedures vary from site to site, therefore conservative estimates of process emissions are used (TCS1)

Technical conditions on site and measures to reduce or limit discharges, air emissions and soil spills

Air	No emission control required; required removal efficiency of 0% (TCR5)
Waste water	In the event of discharge to an urban waste water treatment plant, no treatment is required (TCR9)
Soil	Treat emissions in such a way as to ensure typical removal efficacy of (%) (TCR7)

Organisational measures to prevent/limit release from the site (1286)

Prevent the release of undissolved substances or recover them from the waste water (OMS1).

Conditions and measures regarding the municipal waste water treatment plant (1273)

The estimated flow rate exiting the industrial waste water treatment plant is 2000 m³/day.

Conditions and measures concerning the external treatment of waste for disposal (1272)

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

Not applicable
Conditions and measures concerning the external recovery of waste (1271)
Not applicable
Other environmental control measures in addition to the previous (1287)
None

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

2. Formulation of ETBE

Section 1	
Title	
Formulation of ETBE; CAS NR 637-92-3	
Use descriptions	
Use sector	Industrial (SU3)
Process categories	PROC1, PROC2, PROC3, PROC4, PROC5, PROC8A, PROC8B, PROC9, PROC15
Environmental release categories	ERC2
Processes, tasks, activities covered	
Formulation, packaging and repackaging of the substance and its mixtures in discontinuous or continuous operations, including storage, transfer of material, mixing, large and small-scale packaging maintenance and associated laboratory activities.	
Section 2 Operating conditions and risk management measures	
Section 2.1 Control of worker exposure	
Product specifications	
Physical state of product	Liquid, vapour pressure > 10 kPa under standard conditions (OC5).
Concentration of substance in product	Covers a percentage of substance in the product up to 100% (if not otherwise indicated) (G13).
Quantity used	Not applicable.
Frequency and duration of use/exposure	Covers a daily exposure of up to 8 hours (if not otherwise indicated) (G2).
Human factors not influenced by risk management	Not applicable.
Other operating conditions that affect exposure	Assumes a use of the product at a temperature no greater than 20° C with respect to ambient temperature, unless specified otherwise (G15). Assumes the application of a basic standard of workplace hygiene (G1).
Exposure scenarios	
Specific measures for risk management and operating conditions	
General exposure (closed systems) (CS15)	No specific measures have been identified (E18).
General exposure (closed systems) (CS15); with sampling (CS56).	Ensure that the operation is carried out outside (E69). Do not carry out activities that include the possibility of exposure of more than 4 hours (OC28). or (G9) Wear a full mask (compliant with standard EN140) equipped with type A filter or superior (PPE22).
General exposure (closed systems) (CS15); Use in discontinuous processes under containment (CS37); with sampling (CS56).	Provide extraction ventilation at emission points (E54).
General exposure (open systems) (CS16). Discontinuous process (CS55). With sampling (CS56). Filling/preparation of equipment from drums or containers (CS45).	Provide extraction ventilation at emission points (E54).
General exposure (closed systems) (CS15); Discontinuous processes at high temperatures (CS136); with sampling (CS56); The operation is performed at high temperatures (>	Formulate the substances in closed or ventilated mixing recipients (E46); Provide extraction ventilation at emission points (E54).

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

20° C above ambient temperature) (OC7).	
Sampling during process (CS2)	Provide extraction ventilation at emission points (E54).
Mixing operations (open systems) (CS30); Discontinuous process (CS55).	Provide extraction ventilation at emission points (E54). Do not carry out activities that include the possibility of exposure of more than 4 hours (OC28). or (G9) Wear a full mask (compliant with standard EN140) equipped with type A filter or superior (PPE22).
Manual (CS34); Transfer/pouring from containers (CS22); non-dedicated structure (CS82).	Ensure that the transfer of the material takes place under containment or extraction ventilation conditions (E66). Do not carry out activities that include the possibility of exposure of more than 4 hours (OC28). or (G9) Wear a full mask (compliant with standard EN140) equipped with type A filter or superior (PPE22).
Transfer of drums/lots (CS8); dedicated structure (CS81)	Use pumps for drums (E53); Limit exposure by partially isolating operations or equipment and provide correct extraction ventilation in the event of openings (E60).
Filling of drums and small containers (CS6); dedicated structure (CS81)	Fill containers/cans at dedicated filling points equipped with localised extraction ventilation (E51).
Cleaning and maintenance of equipment (CS39); non-dedicated structure (CS82).	Drain and bleed the system before opening or performing maintenance on equipment (E55). Do not carry out activities that provide the possibility of exposure of more than 1 hour (OC27). Wear a full mask (compliant with standard EN140) equipped with type A filter or superior (PPE22).

Section 2.2 Control of environmental exposure

Product specifications

The substance is formed of a single chemical entity (PrC1); Prevalently hydrophobic (PrC4a); Readily biodegradable (PrC5a).

Operating conditions

For outside use (OOC1).

Quantity used

Regional tonnage (tons/year) (A2)	901,000
Fraction of regional tonnage used locally (A3)	0.05
Average daily tonnage at site (kg/per day)	150,167
Annual tonnage at site (tons/year)	45,050

Frequency and duration of use

Continuous release (FD2)

Emission Days (days/year) (FD4)	300
---------------------------------	-----

Other operating conditions that affect environmental exposure

Use in closed systems, in dry or wet processes.

Fraction released into air by process	1.00e-03
Fraction released into waste water by process	3.00e-04
Fraction released into soil by process (regional only)	1.00e-04

RMMs

Process (source) measures and technical conditions to prevent releases

The procedures vary from site to site, therefore conservative estimates of process emissions are used (TCS1)

Technical conditions on site and measures to reduce or limit discharges, air emissions and soil spills

Air	No emission control required; required removal efficiency of 0% (TCR5)
Waste water	In the event of discharge to an urban waste water treatment plant, no treatment is required (TCR9)
Soil	Treat emissions in such a way as to ensure typical removal efficacy of (%) (TCR7)

Organisational measures to prevent/limit release from the site (1286)

Prevent the release of undissolved substances or recover them from the waste water (OMS1).

Conditions and measures regarding the municipal waste water treatment plant (1273)

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

The estimated flow rate exiting the industrial waste water treatment plant is 2000 m ³ /day.
Conditions and measures concerning the external treatment of waste for disposal (1272)
Not applicable
Conditions and measures concerning the external recovery of waste (1271)
Not applicable
Other environmental control measures in addition to the previous (1287)
None

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

3. Distribution of ETBE

Section 1	
Title	
Distribution of ETBE; CAS NR 637-92-3	
Use descriptions	
Use sector	Industrial (SU3)
Process categories	PROC1, PROC2, PROC3, PROC4, PROC8A, PROC8B, PROC9, PROC15
Environmental release categories	ERC1, ERC2
Specific environmental release categories	ESVOC3 SpERC
Processes, tasks, activities covered	
Loading (on ships/barges, cistern carriages on road or rail, and IBC containers) and repackaging (in drums and small containers) of the substance, including sampling, storage, unloading, distribution and associated laboratory activities (GES1A_I).	
Section 2 Operating conditions and risk management measures	
Section 2.1 Control of worker exposure	
Product specifications	
Physical state of product	Liquid, vapour pressure > 10 kPa under standard conditions (OC5).
Concentration of substance in product	Covers a percentage of substance in the product up to 100% (if not otherwise indicated) (G13).
Quantity used	Not applicable.
Frequency and duration of use/exposure	Covers a daily exposure of up to 8 hours (if not otherwise indicated) (G2).
Human factors not influenced by risk management	Not applicable.
Other operating conditions that affect exposure	Assumes a use of the product at a temperature no greater than 20° C with respect to ambient temperature, unless specified otherwise (G15). Assumes the application of a basic standard of workplace hygiene (G1).
Exposure scenarios	
Specific measures for risk management and operating conditions	
General exposure (closed systems) (CS15)	No specific measures have been identified (E18).
General exposure (closed systems) (CS15); with sampling (CS56).	Ensure that the operation is carried out outside (E69). Do not carry out activities that include the possibility of exposure of more than 4 hours (OC28). or (G9) Wear a full mask (compliant with standard EN140) equipped with type A filter or superior (PPE22).
General exposure (closed systems) (CS15); Use in discontinuous processes under containment (CS37); with sampling (CS56).	Provide extraction ventilation at emission points (E54).
General exposure (open systems) (CS16). Discontinuous process (CS55). With sampling (CS56). Filling/preparation of equipment from drums or containers (CS45).	Provide extraction ventilation at emission points (E54). Ensure that samples are taken under containment or extraction ventilation conditions (E76).
Sampling during process (CS2)	Do not carry out activities that provide the possibility of exposure of more than 15 minutes (OC26). Wear a full mask (compliant with standard EN140) equipped with type A filter or superior (PPE22).
Laboratory activity (CS36); Cleaning (CS47)	Ensure an adequate standard of controlled ventilation (from 10 to 15 air exchanges per hour) (E40).

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

Closed loading/unloading of loose product (CS501) dedicated structure (CS81)	Ensure that the operation is carried out outside (E69); Do not carry out activities that include the possibility of exposure of more than 1 hour (OC27); Wear a full mask (compliant with standard EN140) equipped with type A filter or superior (PPE22).
Open loading/unloading of loose product (CS503); non-dedicated structure (CS82).	Ensure that the transfer of the material takes place under containment or extraction ventilation conditions (E66). Do not carry out activities that include the possibility of exposure of more than 4 hours (OC28); or (G9) Wear a full mask (compliant with standard EN140) equipped with type A filter or superior (PPE22).
Filling of drums and small containers (CS6); dedicated structure (CS81).	Fill containers/cans at dedicated filling points equipped with localised extraction ventilation (E51).
Cleaning and maintenance of equipment (CS39); non-dedicated structure (CS82).	Drain and bleed the system before opening or performing maintenance on equipment (E55). Do not carry out activities that provide the possibility of exposure of more than 4 hours (OC28). Wear a full mask (compliant with standard EN140) equipped with type A filter or superior (PPE22).
Storage (CS67) General exposure (closed systems) (CS15)	No specific measures have been identified (E118).
Storage (CS67) General exposure (closed systems) (CS15) with sampling (CS56).	Professional and domestic use of the product that leads to the immersion of substances in a matrix (OC27). Wear a full mask (compliant with standard EN140) equipped with type A filter or superior (PPE22).

Section 2.2 Control of environmental exposure

Product specifications

The substance is formed of a single chemical entity (PrC1); Prevalently hydrophobic (PrC4a); Readily biodegradable (PrC5a).

Transport and distribution

Operating conditions

For outside use (OOC1).

Quantity used

Fraction of EU tonnage used locally (A1)	1.00
Regional tonnage (tons/year) (A2)	901,000
Fraction of regional tonnage used locally (A3)	0.02
Average daily tonnage at site (kg/per day)	51,486
Annual tonnage at site (tons/year)	18,020

Frequency and duration of use

Continuous release (FD2)	
Emission Days (days/year) (FD4)	350

Other operating conditions that affect environmental exposure

Use in closed systems, in dry or wet processes.

Fraction released into air by process	1.00e-04
Fraction released into waste water by process	1.00e-05
Fraction released into soil by process (regional only)	1.00e-05

RMMs

Process (source) measures and technical conditions to prevent releases

The procedures vary from site to site, therefore conservative estimates of process emissions are used (TCS1)

Technical conditions on site and measures to reduce or limit discharges, air emissions and soil spills

Air	No emission control required; required removal efficiency of 0% (TCR5)
Waste water	Treat waste water on site (before discharge operations begin) to ensure the required removal

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

	efficacy >97 % (TCR8)
Soil	Treat emissions in such a way as to ensure typical removal efficacy of (%) (TCR7)
Organisational measures to prevent/limit release from the site (1286)	
Prevent the release of undissolved substances or recover them from the waste water (OMS1).	
Conditions and measures regarding the municipal waste water treatment plant (1273)	
The estimated flow rate exiting the industrial waste water treatment plant is 2000 m ³ /day.	
Conditions and measures concerning the external treatment of waste for disposal (1272)	
Not applicable	
Conditions and measures concerning the external recovery of waste (1271)	
Not applicable	
Other environmental control measures in addition to the previous (1287)	
None	
Storage	
Operating conditions	
For outside use (OOC1).	
Quantity used	
Fraction of EU tonnage used locally (A1)	1.00
Regional tonnage (tons/year) (A2)	901,000
Fraction of regional tonnage used locally (A3)	1
Average daily tonnage at site (kg/per day)	2,468,493
Annual tonnage at site (tons/year)	901,000
Frequency and duration of use	
Continuous release (FD2)	
Emission Days (days/year) (FD4)	365
Other operating conditions that affect environmental exposure	
Use in closed systems, in dry or wet processes.	
Release from process waste water (Kg/day)	8.4
RMMs	
Process (source) measures and technical conditions to prevent releases	
The procedures vary from site to site, therefore conservative estimates of process emissions are used (TCS1)	
Technical conditions on site and measures to reduce or limit discharges, air emissions and soil spills	
Air	Emission controls are not applicable because no direct release into the air is recorded (TCR2).
Waste water	Treat waste water on site (before discharge operations begin) to ensure the required removal efficacy >99 % (TCR8)
Soil	Soil emission controls are not applicable because no direct release into the soil is recorded (TCR4).
Organisational measures to prevent/limit release from the site (1286)	
Prevent the release of undissolved substances or recover them from the waste water (OMS1).	
Conditions and measures regarding the municipal waste water treatment plant (1273)	
The estimated flow rate exiting the industrial waste water treatment plant is 2000 m ³ /day.	
Conditions and measures concerning the external treatment of waste for disposal (1272)	
Not applicable	
Conditions and measures concerning the external recovery of waste (1271)	
Not applicable	
Other environmental control measures in addition to the previous (1287)	
None	

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

4. Use of ETBE in fuels – Industrial sector

Section 1	
Title	
Use of ETBE in fuels; CAS NR 637-92-3	
Use descriptions	
Use sector	Industrial (SU3)
Process categories	PROC1, PROC2, PROC3, PROC8A, PROC8B, PROC16
Specific environmental release categories	ESVOC3 SpERC
Processes, tasks, activities covered	
Covers use as a fuel (or fuel additive), including activities associated with the transfer, use and maintenance of equipment and disposal of waste (GES12_I).	
Section 2 Operating conditions and risk management measures	
Section 2.1 Control of worker exposure	
Product specifications	
Physical state of product	Liquid, vapour pressure > 10 kPa under standard conditions (OC5).
Concentration of substance in product	Covers a percentage of substance in the product up to 15%
Quantity used	Not applicable
Frequency and duration of use/exposure	Covers a daily exposure of up to 8 hours (if not otherwise indicated) (G2).
Human factors not influenced by risk management	Not applicable.
Other operating conditions that affect exposure	Assumes the application of a basic standard of workplace hygiene (G1).
Exposure scenarios	Specific measures for risk management and operating conditions
Transfer of loose products (CS14); Discontinuous process (CS55); With sampling (CS56); Filling/preparation of equipment from drums or containers (CS45).	Handle the substance within a prevalently closed system equipped with extraction ventilation (E49). Do not carry out activities that provide the possibility of exposure of more than 4 hours (OC28). Wear a full mask (compliant with standard EN140) equipped with type A filter or superior (PPE22).
Transfer of drums/lots (CS8); Filling/preparation of equipment from drums or containers (CS45); Transfer of loose products (CS14); dedicated structure (CS81).	Use pumps for drums (E53).
General exposure (closed systems) (CS15)	No specific measures have been identified (E118).
General exposure (closed systems) (CS15); with sampling (CS56).	Provide an extraction ventilation system at all material transfer points and other openings (E82).
General exposure (closed systems) (CS15); Use in discontinuous processes under containment (CS37); with sampling (CS56).	Provide extraction ventilation at emission points (E54).
(closed systems) (CS107); use of fuel.	No specific measures have been identified (E118).
Cleaning and maintenance of equipment (CS39); non dedicated structure (CS82) for	Drain the system before opening or performing maintenance on equipment (E65). Do not carry out activities that provide the possibility of exposure of more

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

example repair of fuel pumps inside buildings.	than 4 hours (OC28).
Storage (CS67); General exposure (closed systems) (CS15)	No specific measures have been identified (EI18).
Storage (CS67); General exposure (closed systems) (CS15); with sampling (CS56).	Ensure that the operation is carried out outside (E69)
Section 2.2 Control of environmental exposure	
Product specifications	
The substance is formed of a single chemical entity (PrC1); Prevalently hydrophobic (PrC4a); Readily biodegradable (PrC5a).	
Transport and distribution	
Operating conditions	
For outside use (OOC1).	
Quantity used	
Regional tonnage (tons/year) (A2)	901,000
Fraction of regional tonnage used locally (A3)	0.02
Average daily tonnage at site (kg/per day)	51,486
Annual tonnage at site (tons/year)	18,020
Frequency and duration of use	
Continuous release (FD2)	
Emission Days (days/year) (FD4)	350
Other operating conditions that affect environmental exposure	
Use in closed systems, in dry or wet processes.	
Fraction released into air by process	1.00e-04
Fraction released into waste water by process	1.00e-05
Fraction released into soil by process (regional only)	1.00e-05
RMMs	
Process (source) measures and technical conditions to prevent releases	
The procedures vary from site to site, therefore conservative estimates of process emissions are used (TCS1)	
Technical conditions on site and measures to reduce or limit discharges, air emissions and soil spills	
Air	No emission control required; required removal efficiency of 0% (TCR5)
Waste water	Treat waste water on site (before discharge operations begin) to ensure the required removal efficacy >95 % (TCR8)
Soil	Treat emissions in such a way as to ensure typical removal efficacy of 0% (TCR7)
Organisational measures to prevent/limit release from the site (1286)	
Prevent the release of undissolved substances or recover them from the waste water (OMS1).	
Conditions and measures regarding the municipal waste water treatment plant (1273)	
The estimated flow rate exiting the industrial waste water treatment plant is 2000 m ³ /day.	
Conditions and measures concerning the external treatment of waste for disposal (1272)	
Not applicable	
Conditions and measures concerning the external recovery of waste (1271)	
Not applicable	
Other environmental control measures in addition to the previous (1287)	
None	

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

5. Use of ETBE in fuels – Professional sector

Section 1	
Title	
Use of ETBE in fuels; CAS NR 637-92-3	
Use descriptions	
Use sector	Professional (SU22)
Process categories	PROC1, PROC2, PROC3, PROC8A, PROC8B, PROC9, PROC16
Specific environmental release categories	ESVOC30 SpERC
Processes, tasks, activities covered	
Covers use as a fuel (or fuel additive), including activities associated with the transfer, use and maintenance of equipment and disposal of waste (GES12_I).	
Section 2 Operating conditions and risk management measures	
Section 2.1 Control of worker exposure	
Section 2.1 Control of worker exposure	
Product specifications	
Physical state of product	Liquid, vapour pressure > 10 kPa under standard conditions (OC5).
Concentration of substance in product	Covers a percentage of substance in the product up to 15%
Quantity used	Not applicable
Frequency and duration of use/exposure	Covers a daily exposure of up to 8 hours (if not otherwise indicated) (G2).
Human factors not influenced by risk management	Not applicable.
Other operating conditions that affect exposure	Assumes the application of a basic standard of workplace hygiene (G1).
Exposure scenarios	Specific measures for risk management and operating conditions
Transfer of loose products (CS14); Discontinuous process (CS55); Filling/preparation of equipment from drums or containers (CS45).	Ensure that the operation is carried out outside (E69) Do not carry out activities that provide the possibility of exposure of more than 4 hours (OC28). Wear a full mask (compliant with standard EN140) equipped with type A filter or superior (PPE22).
Transfer of drums/lots (CS8); Filling/preparation of equipment from drums or containers (CS45); Transfer of loose products (CS14); dedicated structure (CS81).	Ensure that the operation is carried out outside (E69). Ensure that the transfer of the material takes place under containment or extraction ventilation conditions (E66).
Fuelling (CS507)	Ensure an adequate standard of controlled ventilation (from 10 to 15 air exchanges per hour) (E40). Do not carry out activities that provide the possibility of exposure of more than 1 hour (OC27). Wear a full mask (compliant with standard EN140) equipped with type A filter or superior (PPE22).
General exposure (closed systems) (CS15); with sampling (CS56).	Do not carry out activities that provide the possibility of exposure of more than 4 hours (OC28). Wear a full mask (compliant with standard EN140) equipped with type A filter or superior (PPE22).
General exposure (closed systems) (CS15); Use in discontinuous processes under containment (CS37);	Ensure an adequate standard of controlled ventilation (from 10 to 15 air exchanges per hour) (E40).

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

with sampling (CS56).	
Filling of drums and small containers (CS6); dedicated structure (CS81)	Use pumps for drums or take particular care during pouring operations from containers (E64). Do not carry out activities that provide the possibility of exposure of more than 4 hours (OC28). Wear a full mask (compliant with standard EN140) equipped with type A filter or superior (PPE22).
(closed systems) (CS107); use of fuel.	Ensure that the operation is carried out outside (E69) or (G9) Ensure an adequate standard of controlled ventilation (from 10 to 15 air exchanges per hour) (E40).
Cleaning and maintenance of equipment (CS39). non dedicated structure (CS82) for example repair of fuel pumps inside buildings.	Drain and bleed the system before opening or performing maintenance on equipment (E55). Do not carry out activities that include the possibility of exposure of more than 4 hours (OC28) or (G9) Wear a full mask (compliant with standard EN140) equipped with type A filter or superior (PPE22).
Cleaning and maintenance of equipment (CS39). non dedicated structure (CS82) for example repair of fuel pumps outside buildings.	Drain and bleed the system before opening or performing maintenance on equipment (E55). Do not carry out activities that include the possibility of exposure of more than 4 hours (OC28) or (G9) Wear a full mask (compliant with standard EN140) equipped with type A filter or superior (PPE22).
Storage (CS67); General exposure (closed systems) (CS15)	No specific measures have been identified (EI18).
Section 2.2 Control of environmental exposure	
Product specifications	
The substance is formed of a single chemical entity (PrC1); Prevalently hydrophobic (PrC4a); Readily biodegradable (PrC5a).	
Operating conditions	
For outside use (OOC1).	
Quantity used	
Average daily consumption for a dispersive type of use (Kg/day)	4.94
Frequency and duration of use	
Dispersive use (FD3).	
Emission Days (days/year) (FD4)	365
Other operating conditions that affect environmental exposure	
Use in open systems	
Fraction released into air from highly dispersive use (regional only) (OOC7)	1.00e-2
Fraction released into waste water from highly dispersive use (OOC8)	1.00e-05
Fraction released onto water surface from highly dispersive use (regional only)	1.00e-04
Fraction released into soil from highly dispersive use (regional only) (OOC9)	1.00e-05
RMMs	
Process (source) measures and technical conditions to prevent releases	
The procedures vary from site to site, therefore conservative estimates of process emissions are used (TCS1)	
Technical conditions on site and measures to reduce or limit discharges, air emissions and soil spills	
Air	No emission control required; required removal efficiency of 0% (TCR5)
Waste water	Treat waste water on site (before discharge operations begin) to ensure the required removal efficacy of 95 % (TCR8)
Soil	Treat emissions in such a way as to ensure typical removal efficacy of 0% (TCR7)

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

Organisational measures to prevent/limit release from the site (1286)
Prevent the release of undissolved substances or recover them from the waste water (OMS1).
Conditions and measures regarding the municipal waste water treatment plant (1273)
The estimated flow rate exiting the industrial waste water treatment plant is 2000 m ³ /day.
Conditions and measures concerning the external treatment of waste for disposal (1272)
Not applicable
Conditions and measures concerning the external recovery of waste (1271)
Not applicable
Other environmental control measures in addition to the previous (1287)
None

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

6. Use of ETBE in fuels – Consumers

Section 1	
Title	
Use of ETBE in fuels; CAS NR 637-92-3	
Use descriptions	
Use sector	Consumers (SU21)
Process categories	PC13
Environmental release categories	ERC8d
Specific environmental release categories	ESVOC30 SpERC
Processes, tasks, activities covered	
Use of fuel for fuelling of 2 and 4-stroke engines.	
Section 2 Operating conditions and risk management measures	
Section 2.1 Control of worker exposure	
Product specifications	
Physical state of product	Liquid, vapour pressure > 10 kPa under standard conditions (OC5).
Vapour pressure	170 hPa at 25°C
Concentration of substance in product	Petrol, containing < 15% of substance
Quantity used	Up to 60 litres for fuelling
Frequency and duration of use/exposure	Up to 3 times per week
Other operating conditions that affect exposure	Use at ambient temperature is assumed unless otherwise specified (ConsOC15)
Exposure scenarios	Specific measures for risk management and operating conditions
PC13: Fuel	OC Unless specified otherwise, includes concentrations up to 15% (ConsOC1); includes usage up to 150 days/year (ConsOC3); includes usage up to 1 time per day of use (ConsOC4); for each usage, includes exposures of up to 15 minutes per event (ConsOC14).
	RMM No specific RMM value developed in addition to the OCs given.
Section 2.2 Control of environmental exposure	
Product specifications	
The substance is formed of a single chemical entity (PrC1); Prevalently hydrophobic (PrC4a); Readily biodegradable (PrC5a).	
Operating conditions	
For inside/outside use (OOC3).	
Quantity used	
Average daily consumption for a dispersive type of use (Kg/day)	4.94
Frequency and duration of use	
Dispersive use (FD3).	
Emission Days (days/year) (FD4)	365
Other operating conditions that affect environmental exposure	
Use in open systems	
Fraction released into air from highly dispersive use (regional only) (OOC7)	1.00e-02
Fraction released into waste water from highly dispersive use (OOC8)	1.00e-05
Fraction released onto water surface from highly dispersive use (regional only)	1.00e-04
Fraction released into soil from highly dispersive use (regional only) (OOC9)	1.00e-05
RMMs	
Process (source) measures and technical conditions to prevent releases	

ECOFUEL	ETBE (Ethyl tert-butyl ether)
	Date of Amendment: 12 December 2010

The procedures vary from site to site, therefore conservative estimates of process emissions are used (TCS1)	
Technical conditions on site and measures to reduce or limit discharges, air emissions and soil spills	
Air	No emission control required; required removal efficiency of 0% (TCR5)
Waste water	Treat waste water on site (before discharge operations begin) to ensure the required removal efficacy of 95 % (TCR8)
Soil	Treat emissions in such a way as to ensure typical removal efficacy of 0% (TCR7)
Organisational measures to prevent/limit release from the site (1286)	
Prevent the release of undissolved substances or recover them from the waste water (OMS1).	
Conditions and measures regarding the municipal waste water treatment plant (1273)	
The estimated flow rate exiting the industrial waste water treatment plant is 2000 m ³ /day.	
Conditions and measures concerning the external treatment of waste for disposal (1272)	
Not applicable	
Conditions and measures concerning the external recovery of waste (1271)	
Not applicable	
Other environmental control measures in addition to the previous (1287)	
None	