

Material Safety Data Sheet

According to Regulation (EC) n. 1907/2006 and subsequent amendments thereto



GASOLINE

Q8 Quaser s.r.l.

SECTION 1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/ UNDERTAKING

1.1 Product identifier

Product name: Gasoline
Synonym: Gasoline
CAS Number: not applicable (mixture)
EC Number: not applicable (mixture)
Index number: not applicable (mixture)
Registration number: not applicable (mixture)
Unique Formula Identifier (UFI) T300-F057-000P-AY51

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

Relevant identified uses: Use in fuels and other industrial uses

Identified uses in the chemical safety report: generic list of applications

Life cycle:

Manufacture: Manufacture of substance.

Formulation or re-packing: Formulation & (re)packing of substances and mixtures.

Uses at industrial sites: Use of substance as intermediate , Use in fuels.

Widespread uses by professional workers: Use in fuels.

Consumer uses: Use in fuels.

See the annex (Exposure scenarios) for the complete list of uses for which an exposure scenario is provided.

Uses advised against: The Professional and or Consumer Uses of Naphtha substances in coatings and cleaning agents are advised against.

Reason why uses advised against: While these uses have previously been supported, in 2011 ECHA's Committee for Risk Assessment (RAC) issued an Opinion stating that certain petroleum substances in the Naphtha and Kerosine categories presented a hazard of chronic toxicity to the central nervous system. The Opinion proposed more stringent exposure limits which are incompatible with the chemical safety assessments performed for these uses of Naphtha substances. As other Naphtha substances can have composition ranges significantly overlapping those of the substances specified in the Opinion, the advice is applied to all Naphtha substances. Therefore, for reasons of protection of human health, these uses are no longer supported in the registration dossier.

1.3 Details of the safety data sheet supplier:

Company name: Q8 Quaser s.r.l.
Address: Via dell'Oceano Indiano, 13
City / Nation: 00144 – Roma (Italia)
Telephone: +39 06-520881
Competent Technician E-mail: schede@q8.it

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1.4 Emergency number:

For Appropriate National Emergency Information Services see the following link:

<https://echa.europa.eu/it/support/helpdesks>

SECTION 2. HAZARDS IDENTIFICATION

Physico-chemical hazards: the substance is extremely flammable

Human health hazards: this product may cause skin irritation. Inhalation of vapors may cause drowsiness or dizziness. Low viscosity may cause aspiration pulmonary. Aspiration of a substance can occur as it is vomited following ingestion. Aspiration hazard means severe acute effects such as chemical pneumonia, pulmonary injury or death occurring after aspiration. May cause cancer and genetic defects suspected of damaging fertility and the unborn child

Environmental hazards: toxic to aquatic life with long lasting effects.

2.1 Classification of the substance or mixture

Flam. Liquid 1:	H224
Asp. Tox. 1:	H304
Skin Irrit. 2:	H315
STOT Single Exp. 3:	H336
Muta. 1B:	H340
Carc. 1B:	H350
Repr. 2:	H361fd
Aquatic Chronic 2:	H411

Full text of hazard statements see section 16.

Note: the classification of the substance has been performed considering the following:

CLP 01: Naphtha (Benzene $\geq 0.1\%$ w/w; Toluene $\geq 3\%$ w/w; n-hexane $\geq 3\%$ w/w; Flashpoint $< 23\text{ }^{\circ}\text{C}$ and Initial boiling point $< 35\text{ }^{\circ}\text{C}$)

2.2 Label elements



Signal Word: **DANGER**

Hazard Statements

H224: Extremely flammable liquid and vapour

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H304:	May be fatal if swallowed and enters airways
H315:	Causes skin irritation
H336:	May cause drowsiness or dizziness
H340:	May cause genetic defects
H350:	May cause cancer
H361fd:	Suspected of damaging fertility and the unborn child
H411:	Toxic to aquatic life with long lasting effects

Precautionary Statements

Prevention:

P201:	Obtain special instructions before use
P210:	keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking
P273:	Avoid release to the environment
P280:	Wear protective gloves/protective clothing/eye protection/face protection/hearing protection

Response:

P301+310:	IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
P331:	Do NOT induce vomiting

Storage:

P403+233:	Store in a well ventilated place. Keep container tightly closed
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Disposal:

P501:	Dispose of contents/container in accordance with local/regional/national/international
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Other informations: n.a.

Authorization number: n.a.

2.3 Other hazards

Vapors may form explosive mixtures with air. The vapour product is heavier than air: it may accumulate in confined spaces or in depressions, spread at the soil and can create risks of fire and explosion even at a distance. In some circumstances, the product can accumulate static charges in significant amounts, with the risk of discharges which can cause fire or explosion. The product does not meet the criteria for PBT or vPvB classification set out in Annex XIII of REACH.

The substance is not a substance identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 (3) or Commission Regulation (EU) 2018/605. See also sections 9 to 12.

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SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

3.2 Mixture

Component	Identifier	Concentration	Classification according to Reg. (CE) 1272/2008
1. UVCB Substance: LOW BOILING POINT NAPHTHA (PETROLEUM) (<i>"A complex combination of hydrocarbons consisting primarily of paraffins, cycloparaffins, aromatic and olefinic hydrocarbons having carbon numbers predominantly greater than C3-C12 and boiling in the range of 30°C to 260°C"</i>)	CAS Number: 86290-81-5 EINECS Number: 289-220-8 INDEX Number: 649-378-00-4 Registration Number: 01-2119471335-39-XXXX	> 85% v/v	Flam. Liq. 1: H224 Asp. Tox. 1: H304 Skin Irrit. 2: H315 STOT SE 3: H336 Muta. 1B: H340 Carc. 1B: H350 Repr. 2: H361 Aquatic Chronic 2: H411
<p>Note: the product "Low boiling point Naphtha (petroleum)" is classified as the worst case (content of all individual compounds exceeding the limits of specific classification): Benzene $\geq 0.1\%$, Toluene $\geq 3\%$, n-Hexane $\geq 3\%$, Flashpoint $< 23^\circ\text{C}$ e initial boiling points $\leq 35^\circ\text{C}$. Depending on the characteristics and origin of the components, some of the following chemical compounds can be identified in the chemical composition on the finished product. These compounds are not deliberately added.</p>			
a) Benzene	CAS Number: 71-43-2 EINECS Number: 200-753-7 INDEX Number: 601-020-00-8	> 0,1% p/p	Flam. Liq. 2: H225 Carc. 1A: H350 Muta. 1B: H340 STOT RE 1: H372 Asp. Tox. 1: H304 Eye Irrit. 2: H319 Skin Irrit. 2: H315
b) Toluene	CAS Number: 108-88-3 EINECS Number: 203-625-9 INDEX Number: 601-021-00-3	> 3% p/p	Flam. Liq. 2: H225 Repr. 2: H361d STOT RE 2: H373 Asp. Tox. 1: H304 STOT SE 3: H336 Skin Irrit. 2: H315
c) n-Hexane	CAS Number: 110-54-3 EINECS Number: 203-777-6 INDEX Number: 601-037-00-0	> 3% p/p	Flam. Liq. 2: H225 Repr. 2: H361f Asp. Tox. 1: H304 Skin Irrit. 2: H315 STOT RE 2: H373 STOT SE 3: H336 Aquatic Chronic 2: H411

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Component	Identifier	Concentration	Classification according to Reg. (CE) 1272/2008
2. OXYGENATED COMPONENTS		< 15% v/v total	
a) MTBE (methyl <i>tert</i> -butyl ether)	CAS Number: 1634-04-4 EINECS Number: 216-653-1 INDEX Number: 603-181-00-X Registration Number: 01-2119452786-27--XXXX		Flam. Liq. 2: H225 Skin Irrit. 2: H315
b) ETBE (ethyl <i>tert</i> -butyl ether)	CAS Number: 637-92-3 EINECS Number: 211-309-7 Registration Number: 01-2119452785-29-XXXX		Flam. Liq. 2: H225 STOT SE 3: H336
c) TAME (<i>tert</i> -amyl methyl ether)	CAS Number: 994-05-8 EINECS Number: 213-611-4 INDEX Number: 603-213-00-2 Registration Number: n.a.		STOT SE 3: H336 Acute Tox. 4: H302 Flam. Liq. 2: H225
3. ETHANOL	CAS Number: 64-17-5 EINECS Number: 200-578-6 INDEX Number: 603-002-00-5 Registration Number: 01-21194-5761043-XXXX	0 – 5% v/v	Flam. Liq. 2: H225

Full text of H phrases: see section 16.

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SECTION 4. FIRST AID MEASURES

4.1 Description of first aid measures

Eye contact:	Rinse cautiously with water for several minutes, remove contact lenses, if present and easy to do so. Irrigate exposed eyes with 0.9% normal saline if available or water for at least 15 minutes. Irrigate before and after removing the lenses to prevent a carry-over of the substances to the shielded area of the lens.
Skin contact:	Remove contaminated clothing, contaminated footwear and dispose of safely. Wash area with soap and water for 10 to 15 minutes.
Swallowing /aspiration:	Do not induce vomiting as there is high risk of aspiration. Do not give anything by mouth to an unconscious person. If vomiting occurs, the head should be kept low so that the vomit does not enter the lungs (aspiration)
Inhalation:	If breathing is difficult, remove victim to fresh air. Monitor for respiratory distress, administer oxygen and assist ventilation as required. In case of accident or unwellness, seek medical advice immediately (show directions for use or safety data sheet if possible). Check vital signs regularly and act accordingly

4.2 Most important symptoms and effects, both acute and delayed

Skin contact symptoms: may cause skin irritation,

Eye contact symptoms: may cause mild reversible eye irritation.

Inhalation symptoms of vapours: may cause headache, nausea, dizziness. Acute, high dose exposure may cause: central nervous system depression, confusion, altered mental status, seizures, cardiac arrhythmias

Ingestion (swallowing) symptoms: altered state of consciousness and loss of coordination

4.3 Indication of any immediate medical attention and special treatment needed

In case of ingestion, always assume that aspiration has occurred. Send the casualty immediately to hospital. Do not wait for symptoms to develop.

SECTION 5. FIREFIGHTING MEASURES

5.1 Suitable extinguishing media

Suitable extinguishing media: Small fires: Sand or earth, carbon dioxide, foam (trained personnel only), dry chemical powder. Large fires: Foam (trained personnel only), water fog (trained personnel only). Other inert gases (subject to regulations).

Unsuitable extinguishing media: Do not use direct water jets on the burning product; they could cause splattering and spread the fire. Simultaneous use of foam and water on the same surface is to be avoided as water destroys the foam.

5.2 Special hazards arising from the substance or mixture

Incomplete combustion is likely to give rise to a complex mixture of airborne solid and liquid particulates and gases, including CO (carbon monoxide), SO_x (sulfur oxides), H₂SO₄ (sulfuric acid), and other unidentified organic and inorganic compounds.

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5.3 Advice for firefighters

In case of a large fire or in confined or poorly ventilated spaces, wear full fire resistant protective clothing and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

SECTION 6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

6.1.1 For non-emergency personnel

Stop or contain leak at the source, if safe to do so. Avoid direct contact with released material. Stay upwind. In case of large spillages, alert occupants in downwind areas. Keep non-involved personnel away from the area of spillage. Alert emergency personnel. Except in case of small spillages, the feasibility of any actions should always be assessed and advised, if possible, by a trained, competent person in charge of managing the emergency. Eliminate all ignition sources if safe to do so (e.g. electricity, sparks, fires, flares). If required, notify relevant authorities according to all applicable regulations.

6.1.2 For emergency personnel

Small spillages: normal antistatic working clothes are usually adequate. Hand protection: in the case of possible contact with the skin Compatibility should be checked with the manufacturer. Gloves must be periodically inspected and changed in case of wear, perforations or contaminations.

Large spillages: full body suit of chemically resistant and antistatic material. Use gloves that are resistant to hydrocarbons (tested to EN374)..Gloves made of PVA are not water-resistant, and are not suitable for emergency use. Work helmet. Antistatic non-skid safety shoes or boots. Goggles and /or face shield, if splashes or contact with eyes is possible or anticipated. Respiratory protection: use a A half or full-face respirator with filter(s) for organic vapours, a Self Contained Breathing Apparatus (SCBA) can be used according to the extent of spill and predictable amount of exposure. If the situation cannot be completely assessed, or if an oxygen deficiency is possible, only SCBA's should be used.

6.2 Environmental precautions

Prevent product from entering sewers, rivers or other bodies of water.

6.3 Methods and material for containment and cleaning up

Spillages to soil: If necessary dike the product with dry earth, sand or similar non-combustible materials. Large spillages may be cautiously covered with foam, if available, to limit fire risk. Do not use direct jets. When inside buildings or confined spaces, ensure adequate ventilation. Absorb spilled product with suitable non-combustible materials. If it is necessary to store any contaminated materials for safe disposal, only suitable containers (airtight, labelled, sealed, waterproof, earthed and bonded) should be used. In case of soil contamination, remove contaminated soil and treat in accordance with local regulations.

Spillages to water: In case of small spillages in closed waters (i.e. ports), contain product with floating barriers or other equipment. Collect spilled product by absorbing with specific floating absorbents. Large spillages: if possible, large spillages in open waters should be contained with floating barriers or other mechanical means only if strictly necessary and the explosion or fire risk cannot be completely assessed, let the product vaporize and disperse naturally. The use of dispersants should be advised by an expert, and, if required, approved by local authorities. If possible, collect the product and contaminated materials with mechanical means, and store/dispose of according to relevant regulations.

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Recommended measures are based on the most likely spillage scenarios for this material; however, local conditions (wind, air temperature, wave/current direction and speed) may significantly influence the choice of appropriate actions.

6.4 Reference to other sections

For more information on personal protective equipment, refer to section 8 " exposure controls/personal protection".

SECTION 7. HANDLING AND STORAGE

7.1 Precautions for safe handling

7.1.1 Protective measures (containment and preventive measures)

Obtain special instructions before use. Risk of explosive mixtures of vapour and air. Ensure that all relevant regulations regarding explosive atmospheres, and handling and storage facilities of flammable products, are followed.

Take precautionary measures against static electricity. Ground/bond containers, tanks and transfer/receiving equipment. The vapour is heavier than air. Beware of accumulation in pits and confined spaces. Keep away from heat/sparks/open flames/hot surfaces. Do not smoke. Use only bottom loading of tankers, in compliance with European legislation. Do not use compressed air for filling, discharging, or handling operations. Avoid contact with skin and eyes. Do not ingest. Do not breathe vapours.

Use and store only outdoors or in a well-ventilated area. Avoid contact with the product. Use adequate personal protective equipment as needed.

Avoid release to the environment. For more information regarding protective equipment and operational conditions see Exposure scenarios.

7.1.2 Advice on general occupational hygiene

Do not breathe dusts/vapours/aerosols. Avoid contact with skin. Keep away from food and beverages. Do not eat, drink or smoke when using this product. Wash the hands thoroughly after handling. Do not reuse contaminated clothing.

7.2 Conditions for safe storage, including any incompatibilities

Storage area layout, tank design, equipment and operating procedures must comply with the relevant European, national or local legislation. Storage installations should be designed with adequate bunds so as to prevent ground and water pollution in case of leaks or spills. Cleaning, inspection and maintenance of internal structure of storage tanks must be done only by properly equipped and qualified personnel as defined by national, local or company regulations. After cleaning of tanks and before entering storage tanks and commencing any operation in a confined area, check the atmosphere for oxygen content, and flammability. Store separately from oxidising agents. Store in a well-ventilated place. Store separately from oxidising agents.

Recommended materials: recommended materials for containers, or container linings use mild steel, stainless steel. Some synthetic materials may be unsuitable for containers or container linings depending on the material specification and intended use. Compatibility should be checked with the manufacturer.

If the product is supplied in containers: keep only in the original container or in a suitable container for this kind of product; store in a well-ventilated place.

Keep containers tightly closed and properly labelled. Protect from the sunlight.

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Light hydrocarbon vapours can build up in the headspace of containers. These can cause flammability / explosion hazards. Open slowly in order to control possible pressure release. Empty containers may contain combustible product residues. Do not weld, solder, drill, cut or incinerate empty containers, unless they have been properly cleaned.

7.3 Specific end uses

See attached exposure scenarios.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Exposure limit values (components of the mixture)

Occupational exposure limit values:

Component	Occupational exposure limit values	Reference
GASOLINE	TLV®-TWA: 300 ppm TLV®-STEL: 500 ppm	ACGIH 2022
ETHYL <i>TERT</i> -BUTYL ETHER (ETBE)	TLV®-TWA: 25 ppm	ACGIH 2022
METHYL <i>TERT</i> -BUTYL ETHER (MTBE)	TLV®-TWA: 50 ppm	ACGIH 2022
<i>TERT</i> -AMYL METHYL ETHER (TAME)	TLV®-TWA: 20 ppm	ACGIH 2022
ETHANOL	TLV®-STEL: 1000 ppm	ACGIH 2022
BENZENE	Limit Values (8 ore): 1 ppmv 3,25 mg/m ³	D.Lgs 81/08 e s.m.i. Note: Skin
	TLV®-TWA: 0,5 ppm TLV®-STEL: 2,5 ppm	ACGIH 2022
N-HEXANE	Limit Values (8 ore): 20 ppmv 72 mg/m ³	D.Lgs 81/08 e s.m.i.
	TLV®-TWA: 50 ppm	ACGIH 2022

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Component	Occupational exposure limit values	Reference
TOLUENE	Limit Values (8 ore): 50 ppmv 192 mg/m ³	D.Lgs 81/08 e s.m.i. Note: Skin
	TLV®-TWA: 20 ppm	ACGIH 2022 Notation OTO: CSN visual & hearing impair (ototoxicity)

Occupational exposure limit values (atmospheric contaminants): No data available

Monitoring procedures: refer to relevant legislation and in any case to the good industrial health practices in the work place.

Biological Exposure Indices (BEI):

Component	Biological Exposure Indices	Reference
BENZENE	S-phenylmercapturic acid in urine: 25 µg/g creatinine Trans, trans muconic acid in urine: 500 µg/g creatinine	ACGIH 2022
N-HEXANE	2,5 hexanedion in urine: 0,4 mg/l	ACGIH 2022
TOLUENE	toluene in blood: 0,02 mg/l; toluene in urine: 0,03 mg/l o-Cresol in urine: 0,3 mg/g creatinine	ACGIH 2022

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DNEL (Derived No Effect Level)

Route	DNEL for workers				DNEL for the general population			
	Systemic effects Long term	Systemic effects Acute	Local effects Long term	Local effects Acute	Systemic effects Long term	Systemic effects Acute	Local effects Long term	Local effects Acute
Oral	n.a.	n.a.	n.a.	n.a.	No hazard identified	No hazard identified	n.a.	n.a.
Dermal	High hazard (no threshold derived)	High hazard (no threshold derived)	High hazard (no threshold derived)	Low hazard (no threshold derived)	High hazard (no threshold derived)	High hazard (no threshold derived)	High hazard (no threshold derived)	Low hazard (no threshold derived)
Inhalation	DNEL 1.9 mg/m ³ (equivalent to the derived DNEL for benzene) Most sensitive end point: Repeated dose toxicity (inhalation)	1286.4 mg/m ³ Most sensitive end point: Neurotoxicity (inhalation)	837.5 mg/m ³ Most sensitive end point: Irritation respiratory tract	1066.67 mg/m ³ Most sensitive end point: Irritation respiratory tract	0.41 mg /m ³ Most sensitive end point: Repeated dose toxicity	1152 mg /m ³ Most sensitive end point: Neurotoxicity (inhalation)	DNEL 178.57 mg/m ³ Most sensitive end point: Irritation respiratory tract	DNEL 640 mg/m ³ Most sensitive end point: Irritation respiratory tract
Eyes	n.a.	n.a.	n.a.	No hazard identified	n.a.	n.a.		No hazard identified

PNEC(S) (Predicted No Effect Concentration):

PNEC(S) Water, sediments, soil	
-	<p>Substance is a hydrocarbon UVCB: The "hydrocarbon block method" is used for environmental risk assessment (see REACH guidance, R7, app.13-1).</p> <p>A PNEC cannot be derived for UVCBs, therefore, the water, sediments and soil PNECs in relation to "hydrocarbon block" (library using a set of representative hydrocarbon structures with specific physical-chemical parameters (water solubility, vapour pressure, logKow, the melting point and boiling point) and environmental fate parameters: abiotic and biotic ½ life, bioconcentration factor), were derived statistical extrapolation methods HC5 by the Target Lipid Model (TLM) described by McCarthy et al. (1991).</p> <p>Following Final Decisions issued by ECHA, a review of the TLM has been conducted that led to a revised TLM-model and the new results are used in this dossier. For full details refer to the following Appendixes attached in IUCLID Section 13: PETRORISK ProductLibrary tab, PAH Phototoxicity, PNEC HC5, TLM Validation, PETROTOX Verification and NOS Heterocyclics.</p>

Recommended Monitoring procedures: refer to Dir 98/24/EC and s.m.i. Good industrial health practices in the work place.

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8.2 Exposure controls

8.2.1 Appropriate engineering controls

Minimize exposure dusts/vapours/aerosols Before entering storage tanks and commencing any operation in a confined area, check the atmosphere for oxygen content, and flammability. Provide showers and eyewash fountains at the workplace.

8.2.2 Individual protection measures, such as personal protective equipment

(a) Eye/face protection:

In the absence of containment systems and if splashing is likely, full head and face protection (protective shield and/or safety goggles) should be used (EN 166).

(b) Skin protection:

i) Hand protection

In the case of possible contact with the skin use gloves with long cuffs resistant to hydrocarbons, internally plush Presumably adequate materials: nitrile, PVC or PVA (polyvinyl alcohol) with protection from chemical agents at least 5 (breakthrough time > 240 min). Compatibility should be checked with the manufacturer. In the case, refer to UNI EN 374-1:2018. Gloves must be periodically inspected and changed in case of wear, perforations or contaminations. Gloves must be periodically inspected and changed in case of wear, perforations or contaminations.

ii) Other

In the case of product handling, use antistatic working clothes with long sleeves in relation to the risks related to the classification of work areas. In the case, refer to UNI EN 14605:2009. Wash contaminated clothing and clean shoes before reuse.

(c) Respiratory protection

In confined spaces or in the open spaces: wear full mask (filter Brown, organic vapors), UNI EN14387:2021, if exposure levels cannot be determined or estimated with adequate confidence, or an oxygen deficiency is possible, only SCBA's should be used. UNI 11719:2018,

In the open spaces: wear full mask (filter AX Brown, organic gases and vapors of low boiling point). UNI EN14387:2021.

(d) Thermal hazards: see point b



For more information on personal protective equipment and operating conditions, refer to "exposure scenarios".

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8.2.3 Environmental exposure controls

Avoid release to the environment Storage installations should be designed with adequate bunds so as to prevent ground and water pollution in case of leaks or spills. For details, see the attached exposure scenarios.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Physical state	Liquid
b) Color	Limpid (Es autotrazione Italia) Green Violet (es. agricultural use Italy)
c) Odor	Petroleum odor
d) Melting point/freezing point	< - 60 °C (Eaton 1990)
e) Boiling point or initial point and boiling range	25-260 °C (range category) EN ISO 3405 and ASTM D-86 methods Concawe 2010
f) Flammability	Highly flammable
g) Lower and upper explosion limit	LEL 1.4%; UEL 7.6% (Eaton 1990)
h) Flash point	< - 40 °C (motor and aviation gasoline closed cup method) Concawe 2010
i) Auto-ignition temperature	280 °C-470 °C (Concawe 2010)
j) Decomposition temperature	Not applicable
k) pH	Not applicable
l) Kinematic Viscosity	< 1 mm ² /s at 37.8 °C (Concawe 1992)
m) Solubility	Not applicable: substance is a hydrocarbon UVCB.
n) Partition coefficient: n-octanol/water (log value)	Not applicable: substance is a hydrocarbon UVCB.
o) Vapor pressure	4-240 kPa at 37.8 °C (EN 13016-1, Concawe 2010)
p) Density and/or relative density	720-780 kg/m ³ at 15°C (Concawe 2010)
q) Relative vapor density	> 3 (Air =1) (ILO)
r) Particle characteristics	Not applicable

Please note that the information above are the main component of the mixture (hydrocarbon UVCB CAS 86290-81-5)

9.2 Other information

Extremely flammable liquid and vapour

9.2.1 Information with regard to physical hazard classes

The substance is classified as highly flammable

9.2.2 Other safety characteristics

Vapors may form explosive mixtures with air.

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SECTION 10. STABILITY AND REACTIVITY

10.1 Reactivity

The substance does not present additional dangers of reactivity than those reported in the next subsections.

10.2 Chemical stability

This substance is stable in relation to its intrinsic properties.

10.3 Possibility of hazardous reactions

Contact with strong oxidizers (peroxides, chromates, etc.) may cause a fire hazard. A mixture with nitrates or other strong oxidisers (e.g. chlorates, perchlorates, liquid oxygen) may create an explosive mass (Sensitivity to heat, friction or shock cannot be assessed in advance).

10.4 Conditions to avoid

Store separately from oxidising agents.

Keep away from heat/sparks/open flames/hot surfaces. Do not smoke.

Avoid Static Electricity.

10.5 Incompatible materials

Strong oxidizing agents.

10.6 Hazardous decomposition products

The product does not decompose when used for its intended uses.

SECTION 11. TOXICOLOGICAL INFORMATION

Toxicokinetics, metabolism and distribution

There are no experimental studies of the toxicokinetics of gasoline per se, but there have been numerous toxicokinetic studies of the major gasoline constituents. The principal route of exposure for most individuals is inhalation. It has been shown that absorption of inhaled constituents increases with increasing molecular weight, with n-paraffins being more highly absorbed than iso-paraffins and aromatics being more highly absorbed than the corresponding paraffins. The low molecular weight constituents (butanes and pentanes) are poorly absorbed and predominantly exhaled unchanged.

The higher molecular weight constituents are more efficiently absorbed, with metabolism, normally to the corresponding alcohols, and excretion in the urine becoming increasingly important. Dermal contact normally contributes little to overall dose as gasoline constituents in the vapor phase are poorly absorbed percutaneously. Studies with toluene indicate that dermal absorption from vapor is approximately 1% of the amount absorbed by inhalation. When contacted as liquid, gasoline constituents are also poorly absorbed if allowed to evaporate.

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

a) Acute toxicity:

Human evidence indicates that gasoline has very low acute oral, dermal or inhalation toxicity. However, it can produce severe injury if taken into the lung as a liquid, and there may be profound central nervous system depression following prolonged exposure to high levels of vapor. Laboratory animals respond similarly to humans. Neither gasoline itself, nor any of the naphtha blending stocks produces acute oral, dermal or inhalation toxicity under conditions defined by regulatory testing protocols. Therefore, these results do not lead to any classification under the regulation on hazardous substances.

The following is a summary of the more representative studies reported in the Registration dossier.

Method	Results	Remarks	Reference
Oral Route			
RAT Oral (gavage) OECD Guideline 401	DL50: >5000 mg/kg (M/F)	Key study Reliable without restrictions CAS 86290-81-5	UBTL Inc (1986)
Inhalation route			
RAT Inhalation of vapor OECD Guideline 403	LC50: >5610 mg/m ³ /4h (M/F)	Key study Reliable without restrictions CAS 86290-81-5	UBTL Inc (1992)
Dermal route			
RABBIT OECD Guideline 402	DL50: >2000 mg/kg (M/F)	Key study Reliable without restrictions CAS 86290-81-5	UBTL Inc (1986)

b) Skin corrosion/irritation

Animal studies (rabbits) indicate that gasoline and naphtha blending stocks produced some dermal irritation but not corrosion when applied to rabbit skin. Therefore this product is classified as irritating to the skin according to EU regulations H315: Skin irritant

The results of experimental studies are summarized in the following table:

Method	Results	Remarks	reference
RABBIT Semiocclusive (24/48/72 h average); OECD Guideline 404	Irritating Mean Erythema score: 2.56	Key study Reliable without restrictions CAS 86290-81-5	American Petroleum Institute (API) 1995

c) Serious eye damage/irritation

The dermal irritation potential of samples belonging to this category of product has been tested in a large number of studies conducted in general on rabbit. The conclusions of these studies indicate a potential for moderate eye irritation associated with exposure to vapor concentrations above 200 ppm, but the dose-response information is not conclusive.

Therefore these results do not lead to any classification under the regulation on hazardous substances.

The following is a summary of the more representative studies reported in the Registration dossier.

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Method	Results	Remarks	Reference
RABBIT (24/48/72 h average) OECD Guideline 405	Not irritating Mean Conjunctivae score: 0.06	Key study Reliable without restrictions CAS 86290-81-5	UBTL Inc (1985)

d) Respiratory or skin sensitization

Respiratory system

This endpoint is not a REACH requirement. Products in the category of naphtha do not cause respiratory sensitization, it is not necessary no classification of the substance

Skin

In laboratory animals, neither gasoline nor naphtha blending streams induced dermal sensitization in Buehler tests in guinea pigs. Results from these studies indicate no potential for skin sensitization, it is not necessary any classification of the substance.

The following is a summary of the more representative studies reported in the Registration dossier.

Method	Results	Remarks	Reference
GUINEA PIG Guideline 406	Not sensitizing	Key study Reliable without restrictions CAS 86290-81-5	UBTL Inc (1986)

e) Germ cell mutagenicity

The mutagenic potential of naphthas has been extensively studied in a series of *in vivo* and *in vitro* assays. Most studies have not shown consistent evidence of mutagenic activity. The classification as a mutagen is assigned by virtue of the presence of benzene in C \geq 0.1%: Muta 1B; H340 (May cause genetic defects).

The following is a summary of the more representative studies reported in the Registration dossier.

Method	Results	Remarks	Reference
In vitro genic mutation in Salmonella thyphimurium OECD TG 471	Negative	Key study Reliable without restrictions CAS 86290-81-5	American Petroleum Institute (API) 1977
In vivo chromosome aberration RAT EPA OPPTS 870.5395	Negative	Key study Reliable without restrictions CAS 86290-81-5	Huntingdon Life Sciences. 2005

f) Carcinogenicity

Most animal studies with the product sprayed showed a higher incidence of cancer in the liver. The vaporized product, however, contain the aromatic components heavier responsible for the onset of cancer that instead are not present in the vapor phase to which normally a man is exposed. The carcinogenicity studies conducted on naphthas are not sufficient to support the classification as a carcinogen, however, that is ascribed by virtue of the presence of benzene in C \geq 0,1%: Carc. 1B, H350 (May cause cancer).

The following is a summary of the more representative studies reported in the Registration dossier.

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Method	Results	Remarks	Reference
Dermal route			
MOUSE OECD Guideline 451 Exposure: 102 weeks (3 times per week)	NOAEL (carcinogenicity) 0.05 ml male Neoplastic effects: no effects	Key study Reliable without restrictions CAS 86290-81-5	American Petroleum Institute (1983)

Note: Oral carcinogenicity is not a REACH requirement.

g) Reproductive toxicity

Effects on fertility

Most studies have not shown consistent evidence of effects on fertility. The classification of danger to fertility is assigned due to the presence of n-hexane with concentration ranges that can exceed the concentration $C \geq 3\%$. Repr. 2, H361f (Suspected of damaging fertility).

The following is a summary of the more representative studies reported in the Registration dossier.

Method	Results	Remarks	Reference
Dosi: 5000, 10000 20000 mg/m ³ OECD Guideline 416 inhalation: vapour	NOAEC 20000 mg/m ³ (M/F)	key study reliable without restriction) CAS 68514-15-8	McKee et al 2000

Effects on developmental/teratology

Studies have not revealed evidence of developmental toxicity.

This product contain toluene in $C \geq 3\%$ and is attributed to the following classification: Repr. 2: H361d Suspected of damaging the unborn child.

The results of experimental studies are summarized in the following table:

Method	Results	Remarks	Reference
RAT (Sprague-Dawley) dermal Dose levels of 30, 125 and 500 mg/kg/day Exposure: gestation days 0 to 19 (once daily)	NOAEL (teratogenicity): 500 mg/kg bw/day (No adverse effects were observed.)	Key study Reliable with restrictions CAS 64741-55-5	Mobil (1988)
RAT Doses: 2653, 7960, 23900 mg/m ³ OECD Guideline 414 (Prenatal developmental toxicity study) Vapor inhalation	NOAEL 23900 mg/m ³ no adverse effect	Key study Reliable without restrictions	L.Roberts, R White, Q. Bui. W.Daughtrey, F.Koschier, S.Rodney (2001)

h) STOT-single exposure

This product is classified STOT Single Exp. 3: H336: May cause drowsiness or dizziness

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i) STOT-repeated exposure

Oral: data not available

Inhalation: repeated exposure of rats by inhalation to unleaded gasoline and naphtha blending stocks produced very minor effects and only at the highest levels tested (20000 - 30000 mg/m³). The various reported changes at the highest levels included body weight effects, organ weight changes, variations in hematologic parameters

Dermal: the dermal studies indicate that gasoline has a very low potential for systemic toxicity as a consequence of dermal administration. severe dermal effects at the application site.

Therefore, no classification is required by the regulations on hazardous substances.

The following is a summary of the more representative studies reported in the Registration dossier.

Method	Results	Remarks	Reference
Oral route			
RAT Subacute (gavage) 1: 500 mg/kg/day 2: 2000 mg/kg/day Exposure: 28 days (once daily for 5 days per week)	NOAEL < 500 mg/kg (male): induced renal nephropathy in male rat; these effects are not considered biologically relevant to humans	Supporting study Reliable with restrictions CAS 64741-63-5	Halder CA et al. 1985
Inhalation route			
RAT Systemic effects (M/F) Inhalation (vapor) Repeated dose 107-109 weeks 6h/days for 5 days per week) OECD 453	NOAEC: 1402 mg/m ³ Diminuzione dell'aumento del peso corporeo	Key study Reliable without restrictions CAS 86290-81-5	MacFarland et al
RAT local /systemic effects (M/F) Inhalation (vapor) Repeated dose 90 days OECD TG 413	NOAEC (local effects): 10000 mg/m ³ red nasal discharge at sign of contact (Male/female) NOAEC (systemic effects): 20000 mg/m ³ (exclusive of male drocarbon nephropathy)	Key study Reliable without restrictions	API 2005
Dermal route			
OECD Guideline 410 (21/28-days)	NOAEL (systemic effects): 3750 mg/m ³	Key study Reliable with restrictions CAS 86290-81-5	UBTL, Inc. 1985

j) aspiration hazard

The low viscosity of this product, <1 mm² at 37,8 °C, may cause risk of aspiration into the lungs during swallowing or subsequent vomiting with lung inflammation (chemical pneumonitis). gasoline is classified in according to EU regulations: Asp. Tox. 1 H304: May be fatal if swallowed and enters airways.

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11.2 Information on other hazards

11.2.1 Endocrine disrupting properties

The substance has no endocrine-disrupting properties.

11.2.2 Other information

Exposure to high levels of gasoline can produce acute central nervous system depression in humans and experimental animals. Gasoline exposure does not affect the immune system in experimental animals at levels up to 20000 mg/m³.

SECTION 12. ECOLOGICAL INFORMATION

The informations in this section are of the UVCB substance CAS number CAS 86290-81-5. According to the information below (toxicity short/long term to fish invertebrates algae and aquatic plants, biodegradation etc), this product is classified as: Aquatic Chronic 2 H411: Toxic to aquatic life with long lasting effects.

12.1 Toxicity

The following is a summary of the more representative studies reported in the Registration dossier.

Endpoint	Results	Remarks
Aquatic Toxicity		
Invertebrates Daphnia magna Short-term toxicity OECD Guideline 202	EL50 48 h: 4.5 mg/l NOELR 48 h: 0.5 mg/l	Key study, CONCAWE (1995h), (1996j), (1996k) Reliable without restrictions
Invertebrates Daphnia magna Long-term toxicity OECD Guideline 211	NOELR 21 d: 2.6 mg/l EL50 21 d: 10 mg/l	Key study Springborn Laboratories, Inc. (1999d) Reliable without restrictions Light alkylate naphtha
Alga Short-term Selenastrum capricornutum OECD Guideline 201	EL50 72 h: 3.1 mg/l EC50 96 h: 3.7 mg/l NOELR 72 h: 0.5 mg/l	Key study Exxon Biomedical Sciences, Inc., East Millstone, NJ 1995 Reliable without restrictions
Fish Short-term OECD Guideline 203	LC50 48h: 5.4 mg/l	Supporting study CAS 86290-81-5 Lockhart WL, Danell RW and Murray DAJ 1987 Reliable with restrictions
Fish Short-term Pimephales promelas Metodo EPA 66013-75-009	LL50 96 h: 8.2 mg/l	Key study Reliable without restrictions CAS 64741-66-8 Petroleum Product Stewardship Council (PPSC) 1995
Fish Long-term Pimephales promelas OECD Guideline 204	NOELR 14 d: 2.6 mg/l LL50 14 d: 5.2 mg/l	Supporting Study Light Catalytically Reformed Naphtha Springborn Laboratories, Inc. 1999 Reliable with restrictions
Microorganisms Tetrahymena pyriformis QSAR	EC50 40 h: 15.41 mg/l	Key study Redman, A. et al. 2010 Reliable with restrictions

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12.2 Persistence and degradability

Abiotic degradation

- Hydrolysis: Hydrolysis: the available data and available weight of evidence demonstrate that these products are resistant to hydrolysis because they lack a functional group that is hydrolytically reactive. Therefore, this fate process will not contribute to a measurable degradative loss of these substances from the environment.
- Photolysis in air: endpoint is not required by REACH
- Photolysis in water and soil: endpoint is not required by REACH

Biotic degradation

- Water/sediment/soil: substance is a hydrocarbon UVCB. Standard tests for this endpoint are intended for single substance

12.3 Bioaccumulative potential

Substance is a hydrocarbon UVCB. Standard tests for this endpoint are intended for single substances and are not appropriate for this complex substance.

12.4 Mobility in soil

Partition coefficient Koc: Substance is a hydrocarbon UVCB. Standard tests for this endpoint are intended for single substances and are not appropriate for this complex substance.

12.5 Results of the PBT and vPvB assessment

The UVCB substance does not contain any PBT / vPvB constituents included in the SVHC Candidate List at concentrations above 0.1%. No other representative hydrocarbon structures were found to meet the PBT / vPvB (Evaluation of PBT for Petroleum Hydrocarbons criteria. "Concawe, 2019". In conclusion, the substance does not meet the PBT or vPvB classification criteria set out in Annex XIII of REACH.

12.6 Endocrine disrupting properties

The substance has no endocrine-disrupting properties.

12.7 Other adverse effects

This substance may contribute to ozone formation in the near surface atmosphere.

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SECTION 13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Do not dispose the product, either new or used, by discharging into sewers, tunnels, lakes or water courses. Dispose wastes and contaminated packaging according to official regulations. European Waste Catalogue code(s) (Decision 2001/118/CE): 13 07 02. These codes can be given only as a suggestion, according to the original composition of the product, and its intended (foreseeable) use(s). The final user has the responsibility for the attribution of the most suitable code, according to the actual use(s) of the material, contaminations or alterations. The product does not contain halogenated compounds. Disposal of emptied containers: dispose of in accordance with local regulations. Do not cut, weld, bore, burn or incinerate emptied containers, unless they have been cleaned and declared safe.

SECTION 14. TRANSPORT INFORMATION

Regulations applicable to road transport

ADR Agreement, Annexes A and B

Regulations applicable to rail transport

COTIF Convention, Appendix C, RID Regulation

Regulations applicable to inland waterway transport

ADN Agreement, Annex

Regulations applicable to maritime transport

IMDG Code

Regulations applicable to air transport

ICAO Technical Instructions

IATA DGR Manual

14.1 UN number or ID Number

UN 1203

14.2 UN proper shipping name

Italian: BENZINA

English: MOTOR SPIRIT/GASOLINE/PETROL

14.3 Transport hazard class(es)

<i>Road transport (ADR):</i>	Class: 3	Subsidiary hazards:	-
<i>Railway transport (RID):</i>	Class: 3	Subsidiary hazards:	-
<i>Inland waterways transport (ADN):</i>	Class: 3	Subsidiary hazards:	N2, CMR, F

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Sea transport (IMDG): Class: 3
Subsidiary hazards: -

Air transport (IATA): Class: 3
Subsidiary hazards: -

14.4 Packing group

PG: II

14.5 Environmental hazards

Road transport (ADR): Environmentally hazardous

Railway transport (RID): Environmentally hazardous

Inland waterways transport (ADN): Environmentally hazardous

Sea transport (IMDG): Marine Pollutant (MP)

Air transport (IATA): Environmentally hazardous

14.6 Special precautions for user

Carriage, including loading and unloading, must be performed by personnel who have received the necessary training required by the relevant modal regulations concerning the transport of dangerous goods.

Ensure that the transfer of the material under conditions of containment or extraction ventilation.

During loading and unloading apply safety measures required by section 7.1 and individual protection measures required by section 8.2.2 of this SDS.

Further prescriptions are reported in the applicable regulations.

General additional information

Mark and labeling: MODEL No. 3 HAZARD LABEL + ENVIRONMENTALLY HAZARDOUS
(except packaging or carriage in exemption) SUBSTANCE MARK

Additional information on road transport (ADR)

Transport category according to ADR 1.1.3.6: 2
Tunnel restriction code: (D/E)
Hazard Identification Number (tank): 33
High Consequence Dangerous Goods (HCDG): YES, for tanks carrying over 3000 liters

Additional information on railway transport (RID)

Hazard Identification Number (tank): 33
High Consequence Dangerous Goods (HCDG): YES, for tanks carrying over 3000 liters

Additional information on internal waterways transport (ADN)

Hazard Identification Number (tank): 33
High Consequence Dangerous Goods (HCDG): YES, for tanks carrying over 3000 liters

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Additional information on sea transport (IMDG)

Emergency Schedules EmS F-E, S-E

Additional information on air transport (IATA)

Emergency measures in case of aircraft accidents: ERG Code 3H

14.7 Maritime transport in bulk according to IMO instruments

Not applicable (refer to Annex I of MARPOL Convention).

SECTION 15. REGULATORY INFORMATION

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

- Title VII authorizations under the REACH Regulation (EC Reg. No. 1907/2006): This product is not subject to authorization
- Title VIII restrictions under the REACH Regulation (EC Reg. No. 1907/2006): Annex XVII, items 3, 28, 29, and 40

Other UE:

- *The substance is dangerous under the Seveso Regulation (Dir. 2012/18/UE):*
Annex 1 part 1:
Category P5c: -Flammable liquid-
Category E2: Hazardous to the Aquatic Environment in Category Chronic 2
Annex 1 part 2: category 34 Petroleum products and alternative fuels
- *Directive 98/24/EC (on the protection of the health and safety of workers from the risks related to chemical agents at work) :* Hazardous chemical agent
- *Directive 97/42/EC and 99/38/CE:* Carcinogen and mutagen agent

Dispose wastes and contaminated packaging according to official regulations.

15.2 Chemical safety assessment

Chemical safety assessment has been carried out.

SECTION 16. OTHER INFORMATION

List of relevant H phrases:

H224:	Extremely flammable liquid and vapour
H225:	Highly flammable liquid and vapour
H302:	Harmful if swallowed
H304:	May be fatal if swallowed and enters airways

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- H315: Causes skin irritation
- H319: Causes serious eye irritation
- H336: May cause drowsiness or dizziness
- H340: May cause genetic defects
- H350: May cause cancer
- H361: Suspected of damaging fertility or the unborn child
- H361d: Suspected of damaging the unborn child
- H361f: Suspected of damaging fertility
- H372: Causes damage to organs through prolonged or repeated exposure
- H373: May cause damage to organs through prolonged or repeated exposure
- H411: Toxic to aquatic life with long lasting effects

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Advice on any training appropriate for workers:

Have been properly trained workers potentially exposed to this substance on the basis of the contents of this safety data sheet.

Key literature references and sources for data:

REACH registration dossier, CSR 2016, CSR 2017, CSR 2018, CSR 2019, CSR 2020, CSR 2021, CSR 2022

Legend to abbreviations and acronyms:

- ACGIH = American Conference of Governmental Industrial Hygienists
- CSR = Chemical Safety Report
- DNEL = Derived No effect Level
- DMEL = Derived Minimal Effect Level
- EC50 = Half maximal effective concentration
- IC50 = Half maximal inhibitory concentration
- Klimisch = Scoring system for categorizing reliability, relevance and adequacy of the method used
- LC50 = Lethal concentration, 50%
- LD50 = Median lethal dose
- PNEC = Predicted No Effect Concentration
- 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 Values – Time-Weighted Average
- TLV®STEL = Threshold Limit Values – Short Term Exposure Limit
- UVCB = Unknown or Variable composition, Complex reaction products or Biological materials
- vPvB = very Persistent and very Bioaccumulative
- note P = The harmonised classification as a carcinogen or mutagen applies unless it can be shown that the substance contains less than 0,1 % w/w benzene (Einecs No 200-753-7), in which case a classification in accordance with Title II of this Regulation shall be performed also for those hazard classes.

Revision Index:

- First issue date:* 01/12/2010

- Revision Number:* 01
- Revision Date:* 20/05/2016
- Grounds for review:* Deletion of classification according to Directive 67/548/CEE and related references
Precautionary statement P210 modified, addition of new precautionary statement P273
Deletion of Note H
Section 8 updated
Section 14 updated
Section 15, subsection 15.1 updated
Exposure scenario updated

- Revision Number:* 02
- Revision Date:* 27/10/2017

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Grounds for review: Section 1.2 updated

Revision Number: 03

Revision Date: 15/02/2018

Grounds for review: Section 14 updated

Revision Number: 04

Revision Date: 29/07/2019

Grounds for review: Section 1 updated
Section 3 updated
Section 8 updated
Section 16 updated
Exposure scenario updated

Revision Number: 05

Revision Date: 24/05/2021

Grounds for review: Section 3 updated

Revision Number: 06

Revision Date: 23/01/2023

Grounds for review: update of sections 1, 2, 3, 4, 8, 9, 11, 12, 14, 15, 16 updated the format as the latest update Regulation CE n. 1907/2006 and f.a.

The information and recommendations are offered for the user's consideration and examination. It is the user's responsibility to satisfy itself that the product is suitable for the intended use. Uses not listed in this document are not recommended unless an assessment is completed.

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ANNEX - EXPOSURE SCENARIOS CE 289-220-8

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List of common uses of the mixture components for which were developed the exposure scenarios

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Identified Use	Life cycle	Sector of Use (SU)	Product Category (PC)	Process Category (PROC)	Environmental Release Category (ERC)	Specific Environmental Release Category (SpERC)
Exposure scenario 2 01 – Manufacturing of substance (classified; including H340 and/or H350 and/or H361;(containing 0% to 1% benzene) Closed systems; Level I	Industrial	n.a.	n.a.	1, 2, 3, 8a, 8b, 15, 28	1	ESVOC SpERC 1.1.v1
Exposure scenario 7 02 – Formulation & (re)packing of substances and mixtures (classified; including H340 and/or H350 and/or H361;(containing 0% to 1% benzene) Closed systems; Level I	Formulation	n.a.	n.a.	1, 2, 3, 8a, 8b, 15, 28	2	ESVOC SpERC 2.2.v1
Exposure scenario 11 01b– Use as an intermediate (classified; including H340 and/or H350 and/or H361;(containing 0% to 1% benzene) Closed systems; Level I	Industrial	8, 9	n. a.	1, 2, 3, 8a, 8b, 15, 28	6a	ESVOC SpERC 6.1a.v1
Exposure scenario 13 12a – Use in fuels: Industrial (classified; including H340 and/or H350 and/or H361;(containing 0% to 1% benzene) Closed systems; Level I	Industrial	n.a	n.a.	1, 2, 8a, 8b, 16, 28	7	ESVOC SpERC 7.12a.v1
Exposure scenario 16 12b – Use in fuels: Professional (classified; including H340 and/or H350 and/or H361;(containing 0% to 1% benzene) Professional; Closed systems	Professional	n.a.	n.a.	1, 2, 8a, 8b, 16, 28	9a, 9b	ESVOC SpERC 9.12b.v1
Exposure scenario 17 12c – Use in fuels: Consumer (classified; including H340 and/or H350 and/or	Consumer	n.a.	13	n.a.	9a, 9b	ESVOC SpERC 9.12c.v1

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Identified Use	Life cycle	Sector of Use (SU)	Product Category (PC)	Process Category (PROC)	Environmental Release Category (ERC)	Specific Environmental Release Category (SpERC)
H361;(containing 0% to 1% benzene)						

ETBE

Identified Use	Life cycle	Sector of Use (SU)	Product Category (PC)	Process Category (PROC)	Environmental Release Category (ERC)	Specific Environmental Release Category (SpERC)
1- Use as a fuel: Industrial	Industrial	not applicable		1, 2, 3, 8a, 8b, 16	8b	8b
2- Use as a fuel: Professional	Professional	not applicable		1, 2, 3, 8a, 8b, 9, 16	8b, 8e	8b, 8e
3- Use as a fuel: Consumer	Consumer		13	not applicable	8d	8d

MTBE

Identified Use	Life cycle	Sector of Use (SU)	Product Category (PC)	Process Category (PROC)	Environmental Release Category (ERC)	Specific Environmental Release Category (SpERC)
1- Use as a fuel: Industrial	Industrial	not applicable		1, 2, 3, 8a, 8b, 16	8b	8b
2- Use as a fuel: Professional	Professional	not applicable		1, 2, 3, 8a, 8b, 9, 16	8b, 8e	8b, 8e
3- Use as a fuel: Consumer	Consumer		13	not applicable	8d	8d

TAME

Identified Use	Life cycle	Sector of Use (SU)	Product Category (PC)	Process Category (PROC)	Environmental Release Category (ERC)	Specific Environmental Release Category (SpERC)
1- Use as a fuel: Industrial	Industrial	not applicable		1, 2, 3, 8a, 8b, 16	8b	8b
2- Use as a fuel: Professional	Professional	not applicable		1, 2, 3, 8a, 8b, 9, 16	8b, 8e	8b, 8e
3- Use as a fuel: Consumer	Consumer		13	not applicable	8d	8d

ETHANOL

Nome d'uso identificato	Ciclo di vita	Settore d'uso SU	Categorie di processo PROC	Environmental Release Category (ERC)	Specific Environmental Release Category (SpERC)
1- Formulation and (re)packing of substances and mixture	Formulation	not applicable	2, 3, 8a, 8b, 9, 14	2	-

Note: Exposure scenarios have the same numbering as the specific Chemical Safety Reports

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01 Manufacture of substance (classified; including H340 and/or H350 and/or H361) – (containing 0% to 1% benzene) Closed system; Level I

Section 1	
Title	
Manufacture of substance: Closed systems; Level I	
Use Descriptor	
Sector(s) of Use	
Process Categories	1, 2, 3, 8a, 8b, 15, 28
Environmental Release Categories	1
Specific Environmental Release Category	ESVOC SpERC 1.1.v1
Processes, tasks, activities covered	
Manufacture of the substance or use as a process chemical or extraction agent within closed or contained systems. Includes incidental exposures during recycling/ recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel/barge, road/rail car and bulk container).	
Assessment Method	
See Section 3.	
Section 2 Operational conditions and risk management measures	
Section 2.1 Control of worker exposure	
Product characteristics	
Physical form of product	Liquid
Vapour pressure	> 10 kPa at STP
Concentration of substance in product	Covers percentage substance in the product up to 100 %. (unless stated differently) Covers percentage benzene in the substance up to <1%
Frequency and duration of use/exposure	Covers daily exposures up to 8 hours (unless stated differently)
Other Operational Conditions affecting exposure	Assumes a good basic standard of occupational hygiene is implemented Covers use at ambient temperatures. (unless stated differently)
Contributing Scenarios	Specific Risk Management Measures and Operating Conditions
General measures (skin irritants)	Ensure that direct skin contact is avoided. Identify potential areas for indirect skin contact. Wear suitable gloves tested to EN374. Clear spills immediately. Wash off any skin contamination immediately. For further specification, refer to section 8 of the SDS.
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down and flush system prior to equipment break-in or maintenance. Access to work area only for authorised persons. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Wear suitable coveralls to prevent exposure to the skin. Wear respiratory protection when its use is identified for certain contributing scenarios. For further specification, refer to section 8 of the SDS. Clear spills immediately. Dispose of this material and its container at hazardous or special waste collection point. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Ensure control measures are regularly inspected and maintained. Consider the need for risk based health surveillance.
General measures (flammability)	For measures to control risks from physicochemical properties, refer to main body of the SDS, section 7 and/or 8.
General measures (aspiration hazard)	Do not ingest. If swallowed then seek immediate medical assistance.
CS1 General exposures; Closed systems (PROC_2, PROC_1)	Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure. Assumes process temperature up to 800.0 °C

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CS2 General exposures; Batch process; Closed systems (PROC_3)	Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure. Assumes process temperature up to 800.0 °C
CS3 Laboratory activities (PROC_15)	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure. Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Put lids on containers immediately after use Covers use at ambient temperatures (unless stated differently)
CS4 Bulk transfers; Closed systems; Loading and unloading (PROC_8b)	Ensure material transfers are under containment or extract ventilation. Covers use at ambient temperatures (unless stated differently)
CS5 Equipment cleaning and maintenance (PROC_8a, PROC_28)	Drain down and flush system prior to equipment break-in or maintenance. Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Wear suitable coveralls to prevent exposure to the skin. Clear spills immediately. Covers use at ambient temperatures (unless stated differently)
CS6 Storage (PROC_2, PROC_1)	Store substance within a closed system. Covers use at ambient temperatures (unless stated differently)
Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is complex UVCB. Predominantly hydrophobic.	
Amounts used	
Fraction of EU tonnage used in region	0.1
Regional use tonnage (tonnes/year)	1.1E+07
Fraction of Regional tonnage used locally	4.5E-01
Annual site tonnage (tonnes/year)	5.0E+06
Maximum daily site tonnage (kg/day)	1.7E+07
Frequency and duration of use	
Continuous release	
Emission days (days/year)	300
Environmental factors not influenced by risk management	
Local freshwater dilution factor	10
Local marine water dilution factor	100
Other given operational conditions affecting environmental exposure	
Release fraction to air from process (initial release prior to RMM)	8.5E-04
Release fraction to wastewater from process (initial release prior to RMM)	1.5E-05
Release fraction to soil from process (initial release prior to RMM)	0.0001
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	
Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation). Prevent discharge of undissolved substance to or recover from onsite wastewater. If discharging to domestic sewage treatment plant. no onsite wastewater treatment required	
Treat air emission to provide a typical removal efficiency of (%)	9.0E+01
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency >= (%)	94.4
If discharging to domestic sewage treatment plant. provide the required onsite wastewater removal efficiency of >= (%)	0.0
Organisation measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated. contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment (%)	96.1
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	96.1

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Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	1.9E+07		
Assumed domestic sewage treatment plant flow (m ³ /d)	1.0E+04		
Conditions and measures related to external treatment of waste for disposal			
During manufacturing no waste of the substance is generated.			
Conditions and measures related to external recovery of waste			
During manufacturing no waste of the substance is generated.			
Section 3 Exposure Estimation			
3.1. Health			
The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.			
3.2. Environment			
The Hydrocarbon Block Method has been used to calculate environmental exposure with the PETRORISK model.			
Section 4 Guidance to check compliance with the Exposure Scenario			
4.1. Health			
<p>Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented.; Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.; Available hazard data do not enable the derivation of a DNEL for carcinogenic effects.; Available hazard data do not enable the derivation of a DNEL for aspiration effects.; Available hazard data do not enable the derivation of a DNEL for dermal irritant effects.; Risk management measures are based on qualitative risk characterisation.</p>			
CS1 RCR PROC 1, PROC 2 (General exposures; Closed systems)			
Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.814 mg/m ³ (TRA Workers) Exposure/DNEL = 0.424	Exposure/DNEL = 0.424
Inhalation, systemic, acute	Registered substance as such	416.7 mg/m ³ (TRA Workers) RCR = 0.324	Exposure/DNEL = 0.324
	Benzene	3.255 mg/m ³ (TRA Workers)	
Inhalation, local, long term	Registered substance as such	104.2 mg/m ³ (TRA Workers) RCR = 0.124	Final RCR = 0.124
Inhalation, local, acute	Registered substance as such	416.7 mg/m ³ (TRA Workers) RCR = 0.391	Final RCR = 0.391
Dermal, systemic, long term	Benzene	1.37E-3 mg/kg bw/day (TRA Workers)	
Dermal, local, long term	Registered substance as such	0.02 mg/cm ² (TRA Workers)	
	Benzene	2E-4 mg/cm ² (TRA Workers)	
Dermal, local, acute	Registered substance as such	0.02 mg/cm ² (TRA Workers)	
	Benzene	2E-4 mg/cm ² (TRA Workers)	
Combined routes, systemic, acute			Final RCR = 0.324
CS2 RCR PROC 3 (General exposures; Batch process)			

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Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	1.627 mg/m ³ (TRA Workers) Exposure/DNEL = 0.848	Exposure/DNEL = 0.848
Inhalation, systemic, acute	Registered substance as such	833.3 mg/m ³ (TRA Workers) RCR = 0.648	Exposure/DNEL = 0.648
	Benzene	6.509 mg/m ³ (TRA Workers)	
Inhalation, local, long term	Registered substance as such	208.3 mg/m ³ (TRA Workers) RCR = 0.249	Final RCR = 0.249
Inhalation, local, acute	Registered substance as such	833.3 mg/m ³ (TRA Workers) RCR = 0.781	Final RCR = 0.781
Dermal, systemic, long term	Benzene	6.9E-4 mg/kg bw/day (TRA Workers)	
Dermal, local, long term	Registered substance as such	0.02 mg/cm ² (TRA Workers)	
	Benzene	2.01E-4 mg/cm ² (TRA Workers)	
Dermal, local, acute	Registered substance as such	0.02 mg/cm ² (TRA Workers)	
	Benzene	2.01E-4 mg/cm ² (TRA Workers)	
Combined routes, systemic, acute			Final RCR = 0.648

CS3 RCR PROC 15 (Laboratory activities)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.814 mg/m ³ (Measured data: Concawe (without LEV)) Exposure/DNEL = 0.424 Supportive exposure (not used for RC): 1.627 mg/m ³ (TRA Workers) 0.215 mg/m ³ (Measured data: Concawe (with LEV))	Exposure/DNEL = 0.424
Inhalation, systemic, acute	Registered substance as such	833.3 mg/m ³ (TRA Workers) RCR = 0.648	Exposure/DNEL = 0.648
	Benzene	6.509 mg/m ³ (TRA Workers)	
Inhalation, local, long term	Registered substance as such	208.3 mg/m ³ (TRA Workers)	Final RCR = 0.249

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		RCR = 0.249	
Inhalation, local, acute	Registered substance as such	833.3 mg/m ³ (TRA Workers) RCR = 0.781	Final RCR = 0.781
Dermal, systemic, long term	Benzene	3.4E-4 mg/kg bw/day (TRA Workers)	
Dermal, local, long term	Registered substance as such	9.92E-3 mg/cm ² (TRA Workers)	
	Benzene	9.92E-5 mg/cm ² (TRA Workers)	
Dermal, local, acute	Registered substance as such	9.92E-3 mg/cm ² (TRA Workers)	
	Benzene	9.92E-5 mg/cm ² (TRA Workers)	
Combined routes, systemic, acute			Final RCR = 0.648

CS4 RCR PROC 8b (Bulk transfers; Closed systems; Loading and unloading)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.5 mg/m ³ (Measured data: Concawe Report no 13/18) Exposure/DNEL = 0.26 Supportive exposure (not used for RC): 0.244 mg/m ³ (TRA Workers) 0.06 mg/m ³ (Measured data: Concawe Report no 13/18)	Exposure/DNEL = 0.26
Inhalation, systemic, acute	Registered substance as such	125 mg/m ³ (TRA Workers) RCR = 0.097	Exposure/DNEL = 0.097
	Benzene	0.976 mg/m ³ (TRA Workers)	
Inhalation, local, long term	Registered substance as such	31.25 mg/m ³ (TRA Workers) RCR = 0.037	Final RCR = 0.037
Inhalation, local, acute	Registered substance as such	125 mg/m ³ (TRA Workers) RCR = 0.117	Final RCR = 0.117
Dermal, systemic, long term	Benzene	0.014 mg/kg bw/day (TRA Workers)	
Dermal, local, long term	Registered substance as such	0.1 mg/cm ² (TRA Workers)	
	Benzene	1E-3 mg/cm ² (TRA Workers)	
Dermal, local, acute	Registered substance as such	0.1 mg/cm ² (TRA Workers)	
	Benzene	1E-3 mg/cm ² (TRA Workers)	
Combined routes, systemic, acute			Final RCR = 0.097

CS5 RCR PROC 8a, PROC 28 (Equipment cleaning and maintenance)

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Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.3 mg/m ³ (Measured data: Concawe report no 13/18) Exposure/DNEL = 0.156 Supportive exposure (not used for RC): 0.814 mg/m ³ (TRA Workers)	Exposure/DNEL = 0.156
Inhalation, systemic, acute	Registered substance as such	416.7 mg/m ³ (TRA Workers) RCR = 0.324	Exposure/DNEL = 0.324
	Benzene	3.255 mg/m ³ (TRA Workers)	
Inhalation, local, long term	Registered substance as such	104.2 mg/m ³ (TRA Workers) RCR = 0.124	Final RCR = 0.124
Inhalation, local, acute	Registered substance as such	416.7 mg/m ³ (TRA Workers) RCR = 0.391	Final RCR = 0.391
Dermal, systemic, long term	Benzene	0.014 mg/kg bw/day (TRA Workers)	
Dermal, local, long term	Registered substance as such	0.1 mg/cm ² (TRA Workers)	
	Benzene	1E-3 mg/cm ² (TRA Workers)	
Dermal, local, acute	Registered substance as such	0.1 mg/cm ² (TRA Workers)	
	Benzene	1E-3 mg/cm ² (TRA Workers)	
Combined routes, systemic, acute			Final RCR = 0.3244

CS6 RCR PROC 1 PROC2 (Storage)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.814 mg/m ³ Exposure/DNEL = 0.424	Exposure/DNEL = 0.424
Inhalation, systemic, acute	Registered substance as such	416.7 mg/m ³ (TRA Workers) RCR = 0.324	Exposure/DNEL = 0.324
	Benzene	3.255 mg/m ³ (TRA Workers)	
Inhalation, local, long term	Registered substance as such	104.2 mg/m ³ (TRA Workers) RCR = 0.124	Final RCR = 0.124
Inhalation, local, acute	Registered substance as such	416.7 mg/m ³ (TRA Workers) RCR = 0.391	Final RCR = 0.391
Dermal, systemic, long term	Benzene	1,37E-3 mg/kg bw/day (TRA Workers)	
Dermal, local, long term	Registered substance as such	0,02 mg/cm ² TRA Workers)	

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	Benzene	2E-4 mg/cm ² TRA Workers)	
Dermal, local, acute	Registered substance as such	0,02 mg/cm ² TRA Workers)	
	Benzene	2E-4 mg/cm ² (TRA Workers)	
Combined routes, systemic, acute			Final RCR = 0,324

4.2. Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. Required removal efficiency for air can be achieved using onsite technologies, either alone or in combination. Further details on scaling and control technologies are provided in SpERC factsheet (<http://cefic.org/en/reach-for-industries-libraries.html>).

Maximum Risk Characterisation Ratio for Air Emissions RCR _{air}	8.1E-01
Maximum Risk Characterisation Ratio for Wastewater Emissions RCR _{water}	7.1E-01

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02 Formulation & (re)packing of substances and mixtures (classified; including H340 and/or H350 and/or H361; (containing 0% to 1% benzene) – Closed system; Level I

Section 1	
Title	
02 - Formulation & (re)packing of substances and mixtures: Closed systems; Level I	
Use Descriptor	
Sector(s) of Use	
Process Categories	1, 2, 3, 8a, 8b, 15, 28
Environmental Release Categories	2
Specific Environmental Release Category	ESVOC SpERC 2.2.v1
Processes, tasks, activities covered	
Formulation of the substance and its mixtures in batch or continuous operations within closed or contained systems, including incidental exposures during storage, materials transfers, mixing, maintenance, sampling and associated laboratory activities.	
Assessment Method	
See Section 3.	
Section 2 Operational conditions and risk management measures	
Section 2.1 Control of worker exposure	
Product characteristics	
Physical form of product	Liquid
Vapour pressure	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) Covers percentage benzene in the substance up to <1
Amounts used	Not applicable
Frequency and duration of use/exposure	Covers daily exposures up to 8 hours (unless stated differently)
Human factors not influenced by risk management	Not applicable
Other Operational Conditions affecting 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
Contributing Scenarios	
Specific Risk Management Measures and Operating Conditions	
General measures (skin irritants)	Ensure that direct skin contact is avoided. Identify potential areas for indirect skin contact. Wear suitable gloves tested to EN374. Clear spills immediately. Wash off any skin contamination immediately. For further specification, refer to section 8 of the SDS.
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down and flush system prior to equipment break-in or maintenance. Access to work area only for authorised persons. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Wear suitable coveralls to prevent exposure to the skin. Wear respiratory protection when its use is identified for certain contributing scenarios. For further specification, refer to section 8 of the SDS. Clear spills immediately. Dispose of this material and its container at hazardous or special waste collection point. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Ensure control measures are regularly inspected and maintained. Consider the need for risk based health surveillance.
General measures (flammability)	For measures to control risks from physicochemical properties, refer to main body of the SDS, section 7 and/or 8.

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General measures (aspiration hazard)	Do not ingest. If swallowed then seek immediate medical assistance.
CS1 General exposures; Closed systems (PROC_2, PROC_1)	Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure.
CS2 General exposures; Batch process; Closed systems (PROC_3)	Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure.
CS3 Laboratory activities (PROC_15)	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure. Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Put lids on containers immediately after use
CS4 Bulk transfers; Drum/batch transfers; Closed systems (PROC_8b)	Ensure material transfers are under containment or extract ventilation.
CS5 Equipment cleaning and maintenance (PROC_8a, PROC_28)	Drain down and flush system prior to equipment break-in or maintenance. Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply Wear suitable coveralls to prevent exposure to the skin. Clear spills immediately.
Storage (PROC_2, PROC_1)	Store substance within a closed system.
Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is complex UVCB . Predominantly hydrophobic	
Amounts used	
Fraction of EU tonnage used in region	0.1
Regional use tonnage (tonnes/year)	1.0E+07
Fraction of Regional tonnage used locally	3.0E-03
Annual site tonnage (tonnes/year)	3.0E+04
Maximum daily site tonnage (kg/day)	1.0E+05
Frequency and duration of use	
Continuous release	
Emission days (days/year)	300
Environmental factors not influenced by risk management	
Local freshwater dilution factor	10
Local marine water dilution factor	100
Other given operational conditions affecting environmental exposure	
Release fraction to air from process (after typical onsite RMMs. consistent with EU Solvent Emissions Directive requirements)	1.5E-02
Release fraction to wastewater from process (initial release prior to RMM)	6.0E-04
Release fraction to soil from process (initial release prior to RMM)	0.0001
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	
Risk from environmental exposure is driven by freshwater sediment. Prevent discharge of undissolved substance to or recover from onsite wastewater. If discharging to domestic sewage treatment plant. no onsite wastewater treatment required	
Treat air emission to provide a typical removal efficiency of (%)	0.0E+00
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency >= (%)	95.3
If discharging to domestic sewage treatment plant. provide the required onsite wastewater removal efficiency of >= (%)	0.0
Organisation measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated. contained or reclaimed	
Conditions and measures related to municipal sewage treatment plant	
Not applicable as there is no release to wastewater	

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Estimated substance removal from wastewater via domestic sewage treatment (%)	96.1		
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	96.1		
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	1.1E+05		
Assumed domestic sewage treatment plant flow (m ³ /d)	2.0E+03		
Conditions and measures related to external treatment of waste for disposal			
External treatment and disposal of waste should comply with applicable local and/or national regulations			
Conditions and measures related to external recovery of waste			
External recovery and recycling of waste should comply with applicable local and/or national regulations.			
Section 3 Exposure Estimation			
3.1. Health			
The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.			
3.2. Environment			
The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model			
Section 4 Guidance to check compliance with the Exposure Scenario			
4.1. Health			
Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented.; Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.; Available hazard data do not enable the derivation of a DNEL for carcinogenic effects.; Available hazard data do not enable the derivation of a DNEL for aspiration effects.; Available hazard data do not enable the derivation of a DNEL for dermal irritant effects.; Risk management measures are based on qualitative risk characterisation.			
CS1 RCR PROC 1, PROC 2 (General exposure Closed system)			
Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.814 mg/m ³ (TRA Workers) Exposure/DNEL = 0.424	Exposure/DNEL = 0.424
Inhalation, systemic, acute	Registered substance as such	416.7 mg/m ³ (TRA Workers) RCR = 0.324	Exposure/DNEL = 0.324
	Benzene	3.255 mg/m ³ (TRA Workers)	
Inhalation, local, long term	Registered substance as such	104.2 mg/m ³ (TRA Workers) RCR = 0.124	Final RCR = 0.124
Inhalation, local, acute	Registered substance as such	416.7 mg/m ³ (TRA Workers) RCR = 0.391	Final RCR = 0.391
Dermal, systemic, long term	Benzene	1.37E-3 mg/kg bw/day (TRA Workers)	
Dermal, local, long term	Registered substance as such	0.02 mg/cm ² (TRA Workers)	
	Benzene	2E-4 mg/cm ² (TRA Workers)	
Dermal, local, acute	Registered substance as such	0.02 mg/cm ² (TRA Workers)	
	Benzene	2E-4 mg/cm ² (TRA Workers)	
Combined routes, systemic, acute			Final RCR = 0.324

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CS2 RCR PROC 3 (General exposures; Batch process; Closed systems)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	1.627 mg/m ³ (TRA Workers) Exposure/DNEL = 0.848	Exposure/DNEL = 0.848
Inhalation, systemic, acute	Registered substance as such	833.3 mg/m ³ (TRA Workers) RCR = 0.648	Exposure/DNEL = 0.648
	Benzene	6.509 mg/m ³ (TRA Workers)	
Inhalation, local, long term	Registered substance as such	208.3 mg/m ³ (TRA Workers) RCR = 0.249	Final RCR = 0.249
Inhalation, local, acute	Registered substance as such	833.3 mg/m ³ (TRA Workers) RCR = 0.781	Final RCR = 0.781
Dermal, systemic, long term	Benzene	6.9E-4 mg/kg bw/day (TRA Workers)	
Dermal, local, long term	Registered substance as such	0.02 mg/cm ² (TRA Workers)	
	Benzene	2.01E-4 mg/cm ² (TRA Workers)	
Dermal, local, acute	Registered substance as such	0.02 mg/cm ² (TRA Workers)	
	Benzene	2.01E-4 mg/cm ² (TRA Workers)	
Combined routes, systemic, acute			Final RCR = 0.648

CS3 RCR PROC 15 (Laboratory activities)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.814 mg/m ³ (Measured data: Concawe (without LEV)) Exposure/DNEL = 0.424 Supportive exposure (not used for RC): 1.627 mg/m ³ (TRA Workers) 0.215 mg/m ³ (Measured data: Concawe (with LEV))	Exposure/DNEL = 0.424
Inhalation, systemic, acute	Registered substance as such	833.3 mg/m ³ (TRA Workers) RCR = 0.648	Exposure/DNEL = 0.648
	Benzene	6.509 mg/m ³ (TRA Workers)	

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Inhalation, local, long term	Registered substance as such	208.3 mg/m ³ (TRA Workers) RCR = 0.249	Final RCR = 0.249
Inhalation, local, acute	Registered substance as such	833.3 mg/m ³ (TRA Workers) RCR = 0.781	Final RCR = 0.781
Dermal, systemic, long term	Benzene	3.4E-4 mg/kg bw/day (TRA Workers)	
Dermal, local, long term	Registered substance as such	9.92E-3 mg/cm ² (TRA Workers)	
	Benzene	9.92E-5 mg/cm ² (TRA Workers)	
Dermal, local, acute	Registered substance as such	9.92E-3 mg/cm ² (TRA Workers)	
	Benzene	9.92E-5 mg/cm ² (TRA Workers)	
Combined routes, systemic, acute			Final RCR = 0.648

CS4 RCR PROC 8b (Bulk transfers; Drum/batch transfers; Closed systems)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.5 mg/m ³ (Measured data: Concawe Report no 13/18) Exposure/DNEL = 0.26 Supportive exposure (not used for RC): 0.244 mg/m ³ (TRA Workers) 0.06 mg/m ³ (Measured data: Concawe Report no 13/18)	Exposure/DNEL = 0.26
Inhalation, systemic, acute	Registered substance as such	125 mg/m ³ (TRA Workers) RCR = 0.097	Exposure/DNEL = 0.097
	Benzene	0.976 mg/m ³ (TRA Workers)	
Inhalation, local, long term	Registered substance as such	31.25 mg/m ³ (TRA Workers) RCR = 0.037	Final RCR = 0.037
Inhalation, local, acute	Registered substance as such	125 mg/m ³ (TRA Workers) RCR = 0.117	Final RCR = 0.117
Dermal, systemic, long term	Benzene	0.014 mg/kg bw/day (TRA Workers)	
Dermal, local, long term	Registered substance as such	0.1 mg/cm ² (TRA Workers)	
	Benzene	1E-3 mg/cm ² (TRA Workers)	
Dermal, local, acute	Registered substance as such	0.1 mg/cm ² (TRA Workers)	
	Benzene	1E-3 mg/cm ² (TRA Workers)	
Combined routes, systemic, acute			Final RCR = 0.097

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CS5 RCR PROC 8a, PROC 28 (Equipment cleaning and maintenance)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.814 mg/m ³ (TRA Workers) Exposure/DNEL = 0.424	Exposure/DNEL = 0.424
Inhalation, systemic, acute	Registered substance as such	416.7 mg/m ³ (TRA Workers) RCR = 0.324	Exposure/DNEL = 0.324
	Benzene	3.255 mg/m ³ (TRA Workers)	
Inhalation, local, long term	Registered substance as such	104.2 mg/m ³ (TRA Workers) RCR = 0.124	Final RCR = 0.124
Inhalation, local, acute	Registered substance as such	416.7 mg/m ³ (TRA Workers) RCR = 0.391	Final RCR = 0.391
Dermal, systemic, long term	Benzene	0.014 mg/kg bw/day (TRA Workers)	
Dermal, local, long term	Registered substance as such	0.1 mg/cm ² (TRA Workers)	
	Benzene	1E-3 mg/cm ² (TRA Workers)	
Dermal, local, acute	Registered substance as such	0.1 mg/cm ² (TRA Workers)	
	Benzene	1E-3 mg/cm ² (TRA Workers)	
Combined routes, systemic, acute			Final RCR = 0.324

CS6 RCR PROC 1 PROC2 (Storage)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.814 mg/m ³ Exposure/DNEL = 0.424	Exposure/DNEL = 0.424
Inhalation, systemic, acute	Registered substance as such	416.7 mg/m ³ (TRA Workers) RCR = 0.324	Exposure/DNEL = 0.324
	Benzene	3.255 mg/m ³ (TRA Workers)	
Inhalation, local, long term	Registered substance as such	104.2 mg/m ³ (TRA Workers) RCR = 0.124	Final RCR = 0.124
Inhalation, local, acute	Registered substance as such	416.7 mg/m ³ (TRA Workers) RCR = 0.391	Final RCR = 0.391
Dermal, systemic, long term	Benzene	1,37E-3 mg/kg bw/day (TRA Workers)	
Dermal, local, long term	Registered substance as such	0,02 mg/cm ² TRA Workers)	
	Benzene	2E-4 mg/cm ² TRA Workers)	
Dermal, local, acute	Registered substance	0,02 mg/cm ² TRA Workers)	

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	as such		
	Benzene	2E-4 mg/cm ² (TRA Workers)	
Combined routes, systemic, acute			Final RCR = 0,324

4.2. Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. Required removal efficiency for air can be achieved using onsite technologies, either alone or in combination. Further details on scaling and control technologies are provided in SpERC factsheet (<http://cefic.org/en/reach-for-industries-libraries.html>).

Maximum Risk Characterisation Ratio for Air Emissions RCRair	8.2E-01
Maximum Risk Characterisation Ratio for Wastewater Emissions RCRwater	8.4E-01

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01b Use at industrial sites of substance as an intermediate (classified; including H340 and/or H350 and/or H361) – (containing 0% to 1% benzene) Closed system; Level I

Section 1	
Title	
01b - Use of substance as intermediate: Closed systems; Level I	
Use Descriptor	
Sector(s) of Use	8, 9
Process Categories	1, 2, 3, 8a, 8b, 15, 28
Environmental Release Categories	6a
Specific Environmental Release Category	ESVOC SpERC 6.1a.v1
Processes, tasks, activities covered	
Use of substance as an intermediate within closed or contained systems (not related to Strictly Controlled Conditions). Includes incidental exposures during recycling/ recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel/barge, road/rail car and bulk container).	
Assessment Method	
See Section 3.	
Section 2 Operational conditions and risk management measures	
Section 2.1 Control of worker exposure	
Product characteristics	
Physical form of product	Liquid
Vapour pressure	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Concentration of substance in product	Covers percentage substance in the product up to 100 %. (unless stated differently)
Frequency and duration of use/exposure	Covers daily exposures up to 8 hours (unless stated differently)
Other Operational Conditions affecting exposure	Assumes a good basic standard of occupational hygiene is implemented Covers use at ambient temperatures. (unless stated differently)
Contributing Scenarios	Specific Risk Management Measures and Operating Conditions
General measures (skin irritants)	Ensure that direct skin contact is avoided. Identify potential areas for indirect skin contact. Wear suitable gloves tested to EN374. Clear spills immediately. Wash off any skin contamination immediately. For further specification, refer to section 8 of the SDS.
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down and flush system prior to equipment break-in or maintenance. Access to work area only for authorised persons. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Wear suitable coveralls to prevent exposure to the skin. Wear respiratory protection when its use is identified for certain contributing scenarios. For further specification, refer to section 8 of the SDS. Clear spills immediately. Dispose of this material and its container at hazardous or special waste collection point. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Ensure control measures are regularly inspected and maintained. Consider the need for risk based health surveillance.
General measures (flammability)	For measures to control risks from physicochemical properties, refer to main body of the SDS, section 7 and/or 8.
General measures (aspiration hazard)	Do not ingest. If swallowed then seek immediate medical assistance.
CS1 General exposures; Closed systems (PROC_2, PROC_1)	Covers percentage benzene in the final product up to <1%. Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure.

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CS2 General exposures; Batch process; Closed systems (PROC_3)	Covers percentage benzene in the final product up to <1%. Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure.
CS3 Laboratory activities (PROC_15)	Covers percentage benzene in the final product up to <1% Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure. Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Put lids on containers immediately after use
CS4 Bulk transfers; Closed systems; Loading and unloading (PROC_8b)	Covers percentage benzene in the final product up to <1% Ensure material transfers are under containment or extract ventilation.
CS5 Equipment cleaning and maintenance (PROC_8a, PROC_28)	Covers percentage benzene in the final product up to <1% Drain down and flush system prior to equipment break-in or maintenance. Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Wear suitable coveralls to prevent exposure to the skin. Clear spills immediately.
CS6 Storage (PROC_2, PROC_1)	Covers percentage benzene in the final product up to <1% Store substance within a closed system.
Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is complex UVCB. Predominantly hydrophobic	
Amounts used	
Fraction of EU tonnage used in region	0.1
Regional use tonnage (tonnes/year)	6.2E+05
Fraction of Regional tonnage used locally	2.4E-02
Annual site tonnage (tonnes/year)	1.5E+04
Maximum daily site tonnage (kg/day)	5.0E+04
Frequency and duration of use	
Continuous release	
Emission days (days/year)	300
Environmental factors not influenced by risk management	
Local freshwater dilution factor	10
Local marine water dilution factor	100
Other given operational conditions affecting environmental exposure	
Release fraction to air from process (initial release prior to RMM)	2.5E-02
Release fraction to wastewater from process (initial release prior to RMM)	1.3E-03
Release fraction to soil from process (initial release prior to RMM)	0.001
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	
Risk from environmental exposure is driven by freshwater sediment.	
Prevent discharge of undissolved substance to or recover from onsite wastewater.	
If discharging to domestic sewage treatment plant. no onsite wastewater treatment required	
Treat air emission to provide a typical removal efficiency of (%)	8.0E+01
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency >= (%)	95.5
If discharging to domestic sewage treatment plant. provide the required onsite wastewater removal efficiency of >= (%)	0.0
Organisation measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated. contained or reclaimed [OMS3].	
Conditions and measures related to municipal sewage treatment plant	
Not applicable as there is no release to wastewater	
Estimated substance removal from wastewater via domestic sewage treatment (%)	96.1

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Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	96.1
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	5.7E+04
Assumed domestic sewage treatment plant flow (m ³ /d)	2.0E+03

Conditions and measures related to external treatment of waste for disposal

This substance is consumed during use and no waste of the substance is generated.

Conditions and measures related to external recovery of waste

This substance is consumed during use and no waste of the substance is generated.

Section 3 Exposure Estimation

3.1. Health

The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.

3.2. Environment

The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model

Section 4 Guidance to check compliance with the Exposure Scenario

4.1. Health

Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented.; Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.; Available hazard data do not enable the derivation of a DNEL for carcinogenic effects.; Available hazard data do not enable the derivation of a DNEL for aspiration effects.; Available hazard data do not enable the derivation of a DNEL for dermal irritant effects.; Risk management measures are based on qualitative risk characterisation.

CS1 RCR PROC 1, PROC 2 (General exposure Closed system)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.814 mg/m ³ (TRA Workers) Exposure/DNEL = 0.424	Exposure/DNEL = 0.424
Inhalation, systemic, acute	Registered substance as such	416.7 mg/m ³ (TRA Workers) RCR = 0.324	Exposure/DNEL = 0.324
	Benzene	3.255 mg/m ³ (TRA Workers)	
Inhalation, local, long term	Registered substance as such	104.2 mg/m ³ (TRA Workers) RCR = 0.124	Final RCR = 0.124
Inhalation, local, acute	Registered substance as such	416.7 mg/m ³ (TRA Workers) RCR = 0.391	Final RCR = 0.391
Dermal, systemic, long term	Benzene	1.37E-3 mg/kg bw/day (TRA Workers)	
Dermal, local, long term	Registered substance as such	0.02 mg/cm ² (TRA Workers)	
	Benzene	2E-4 mg/cm ² (TRA Workers)	
Dermal, local, acute	Registered substance as such	0.02 mg/cm ² (TRA Workers)	
	Benzene	2E-4 mg/cm ² (TRA Workers)	

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Combined routes, systemic, acute			Final RCR = 0.324
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CS2 RCR PROC 3 (General exposures; Batch process; Closed systems)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	1.627 mg/m ³ (TRA Workers) Exposure/DNEL = 0.848	Exposure/DNEL = 0.848
Inhalation, systemic, acute	Registered substance as such	833.3 mg/m ³ (TRA Workers) RCR = 0.648	Exposure/DNEL = 0.648
	Benzene	6.509 mg/m ³ (TRA Workers)	
Inhalation, local, long term	Registered substance as such	208.3 mg/m ³ (TRA Workers) RCR = 0.249	Final RCR = 0.249
Inhalation, local, acute	Registered substance as such	833.3 mg/m ³ (TRA Workers) RCR = 0.781	Final RCR = 0.781
Dermal, systemic, long term	Benzene	6.9E-4 mg/kg bw/day (TRA Workers)	
Dermal, local, long term	Registered substance as such	0.02 mg/cm ² (TRA Workers)	
	Benzene	2.01E-4 mg/cm ² (TRA Workers)	
Dermal, local, acute	Registered substance as such	0.02 mg/cm ² (TRA Workers)	
	Benzene	2.01E-4 mg/cm ² (TRA Workers)	
Combined routes, systemic, acute			Final RCR = 0.648

CS3 RCR PROC 15 (Laboratory activities)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.814 mg/m ³ (Measured data: Concawe (without LEV)) Exposure/DNEL = 0.424 Supportive exposure (not used for RC): 1.627 mg/m ³ (TRA Workers) 0.215 mg/m ³ (Measured data: Concawe (with LEV))	Exposure/DNEL = 0.424

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Inhalation, systemic, acute	Registered substance as such	833.3 mg/m ³ (TRA Workers) RCR = 0.648	Exposure/DNEL = 0.648
	Benzene	6.509 mg/m ³ (TRA Workers)	
Inhalation, local, long term	Registered substance as such	208.3 mg/m ³ (TRA Workers) RCR = 0.249	Final RCR = 0.249
Inhalation, local, acute	Registered substance as such	833.3 mg/m ³ (TRA Workers) RCR = 0.781	Final RCR = 0.781
Dermal, systemic, long term	Benzene	3.4E-4 mg/kg bw/day (TRA Workers)	
Dermal, local, long term	Registered substance as such	9.92E-3 mg/cm ² (TRA Workers)	
	Benzene	9.92E-5 mg/cm ² (TRA Workers)	
Dermal, local, acute	Registered substance as such	9.92E-3 mg/cm ² (TRA Workers)	
	Benzene	9.92E-5 mg/cm ² (TRA Workers)	
Combined routes, systemic, acute			Final RCR = 0.648

CS4 RCR PROC 8b (Bulk transfers; Loading and unloading, Closed systems;)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.244 mg/m ³ (TRA Workers) Exposure /DNEL = 0,127	Exposure /DNEL = 0.127
Inhalation, systemic, acute	Registered substance as such	125 mg/m ³ (TRA Workers) RCR = 0.097	Exposure/DNEL = 0.097
	Benzene	0.976 mg/m ³ (TRA Workers)	
Inhalation, local, long term	Registered substance as such	31.25 mg/m ³ (TRA Workers) RCR = 0.037	Final RCR = 0.037
Inhalation, local, acute	Registered substance as such	125 mg/m ³ (TRA Workers) RCR = 0.117	Final RCR = 0.117
Dermal, systemic, long term	Benzene	0.014 mg/kg bw/day (TRA Workers)	
Dermal, local, long term	Registered substance as such	0.1 mg/cm ² (TRA Workers)	
	Benzene	1E-3 mg/cm ² (TRA Workers)	
Dermal, local, acute	Registered substance as such	0.1 mg/cm ² (TRA Workers)	
	Benzene	1E-3 mg/cm ² (TRA Workers)	
Combined routes, systemic, acute			Final RCR = 0.097

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CS5 RCR PROC 8a, PROC 28 (Equipment cleaning and maintenance)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.814 mg/m ³ (TRA Workers) Exposure/DNEL = 0.424	Exposure/DNEL = 0.424
Inhalation, systemic, acute	Registered substance as such	416.7 mg/m ³ (TRA Workers) RCR = 0.324	Exposure/DNEL = 0.324
	Benzene	3.255 mg/m ³ (TRA Workers)	
Inhalation, local, long term	Registered substance as such	104.2 mg/m ³ (TRA Workers) RCR = 0.124	Final RCR = 0.124
Inhalation, local, acute	Registered substance as such	416.7 mg/m ³ (TRA Workers) RCR = 0.391	Final RCR = 0.391
Dermal, systemic, long term	Benzene	0.014 mg/kg bw/day (TRA Workers)	
Dermal, local, long term	Registered substance as such	0.1 mg/cm ² (TRA Workers)	
	Benzene	1E-3 mg/cm ² (TRA Workers)	
Dermal, local, acute	Registered substance as such	0.1 mg/cm ² (TRA Workers)	
	Benzene	1E-3 mg/cm ² (TRA Workers)	
Combined routes, systemic, acute			Final RCR = 0.324

CS6 RCR PROC 1 PROC2 (Storage)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.814 mg/m ³ Exposure/DNEL = 0.424	Exposure/DNEL = 0.424
Inhalation, systemic, acute	Registered substance as such	416.7 mg/m ³ (TRA Workers) RCR = 0.324	Exposure/DNEL = 0.324
	Benzene	3.255 mg/m ³ (TRA Workers)	
Inhalation, local, long term	Registered substance as such	104.2 mg/m ³ (TRA Workers) RCR = 0.124	Final RCR = 0.124
Inhalation, local, acute	Registered substance as such	416.7 mg/m ³ (TRA Workers) RCR = 0.391	Final RCR = 0.391
Dermal, systemic, long term	Benzene	1,37E-3 mg/kg bw/day (TRA Workers)	
Dermal, local, long term	Registered substance as such	0,02 mg/cm ² TRA Workers)	

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	Benzene	2E-4 mg/cm ² TRA Workers)	
Dermal, local, acute	Registered substance as such	0,02 mg/cm ² TRA Workers)	
	Benzene	2E-4 mg/cm ² (TRA Workers)	
Combined routes, systemic, acute			Final RCR = 0,324

4.2. Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. Required removal efficiency for air can be achieved using onsite technologies, either alone or in combination. Further details on scaling and control technologies are provided in SpERC factsheet (<http://cefic.org/en/reach-for-industries-libraries.html>).

Maximum Risk Characterisation Ratio for Air Emissions RCRair	1.6E-01
Maximum Risk Characterisation Ratio for Wastewater Emissions RCRwater	8.8E-01

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12a Use in fuels: Industrial (classified; including H340 and/or H350 and/or H361; (containing 0% to 1% benzene) Closed system; Level I

Section 1	
Title	
12a - Use in fuels: Industrial Closed system; Level I	
Use Descriptor	
Sector(s) of Use	
Process Categories	1, 2, 8a, 8b, 16, 28
Environmental Release Categories	7
Specific Environmental Release Category	ESVOC SpERC 7.12a.v1
Processes, tasks, activities covered	
Covers the use in fuels (or fuel additives and additive components) within closed or contained systems, including incidental exposures during activities associated with its transfer, use, equipment maintenance and handling of waste.	
Assessment Method	
See Section 3.	
Section 2 Operational conditions and risk management measures	
Section 2.1 Control of worker exposure	
Product characteristics	
Physical form of product	Liquid
Vapour pressure	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Concentration of substance in product	Covers percentage substance in the product up to 100 %. (unless stated differently) Covers percentage benzene in the final product up to <1%
Frequency and duration of use/exposure	Covers daily exposures up to 8 hours (unless stated differently)
Other Operational Conditions affecting exposure	Assumes a good basic standard of occupational hygiene is implemented Covers use at ambient temperatures. (unless stated differently)
Contributing Scenarios	Specific Risk Management Measures and Operating Conditions
General measures (skin irritants)	Ensure that direct skin contact is avoided. Identify potential areas for indirect skin contact. Wear suitable gloves tested to EN374. Clear spills immediately. Wash off any skin contamination immediately. For further specification, refer to section 8 of the SDS.
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down and flush system prior to equipment break-in or maintenance. Access to work area only for authorised persons. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Wear suitable coveralls to prevent exposure to the skin. Wear respiratory protection when its use is identified for certain contributing scenarios. For further specification, refer to section 8 of the SDS. Clear spills immediately. Dispose of this material and its container at hazardous or special waste collection point. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Ensure control measures are regularly inspected and maintained. Consider the need for risk based health surveillance.
General measures (flammability)	For measures to control risks from physicochemical properties, refer to main body of the SDS, section 7 and/or 8.
General measures (aspiration hazard)	Do not ingest. If swallowed then seek immediate medical assistance.
CS1 Bulk transfers; Dedicated facility (PROC_8b)	Ensure material transfers are under containment or extract ventilation.

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CS2 Drum/batch transfers; Dedicated facility (PROC_8b)	Ensure material transfers are under containment or extract ventilation.
CS3 General exposures; Closed systems (PROC_2, PROC_1)	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure.
CS4 Use of fuels; Closed systems (PROC_16)	Handle substance within a closed system.
CS5 Equipment cleaning and maintenance (PROC_8a, PROC_28)	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Drain down and flush system prior to equipment break-in or maintenance. Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Wear suitable coveralls to prevent exposure to the skin. Clear spills immediately.
CS6 Storage (PROC_2, PROC_1)	Store substance within a closed system.
Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is complex UVCB. Predominantly hydrophobic.	
Amounts used	
Fraction of EU tonnage used in region	0.1
Regional use tonnage (tonnes/year)	9.9.E+05
Fraction of Regional tonnage used locally	1.0E+00
Annual site tonnage (tonnes/year)	9.9E+05
Maximum daily site tonnage (kg/day)	3.3E+06
Frequency and duration of use	
Continuous release	
Emission days (days/year)	300
Environmental factors not influenced by risk management	
Local freshwater dilution factor	10
Local marine water dilution factor	100
Other given operational conditions affecting environmental exposure	
Release fraction to air from process (initial release prior to RMM)	5.0E-02
Release fraction to wastewater from process (initial release prior to RMM)	1.0E-05
Release fraction to soil from process (initial release prior to RMM)	0
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	
Risk from environmental exposure is driven by freshwater sediment. If discharging to domestic sewage treatment plant. no onsite wastewater treatment required	
Treat air emission to provide a typical removal efficiency of (%)	9.5E+01
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency >= (%)	91.5
If discharging to domestic sewage treatment plant. provide the required onsite wastewater removal efficiency of >= (%)	0.0
Organisation measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils--Sludge should be incinerated. contained or reclaimed	
Conditions and measures related to municipal sewage treatment plant	
Not applicable as there is no release to wastewater	
Estimated substance removal from wastewater via domestic sewage treatment (%)	96.1
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	96.1

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Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	7.1E+06		
Assumed domestic sewage treatment plant flow (m3/d)	2.0E+03		
Conditions and measures related to external treatment of waste for disposal			
Combustion emissions limited by required exhaust emission controls. Combustion emissions considered in regional exposure assessment. External treatment and disposal of waste should comply with applicable local and/or national regulations			
Conditions and measures related to external recovery of waste			
This substance is consumed during use and no waste of the substance is generated			
Section 3 Exposure Estimation			
3.1. Health			
The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.			
3.2. Environment			
The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model			
Section 4 Guidance to check compliance with the Exposure Scenario			
4.1. Health			
<p>Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented.; Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.; Available hazard data do not enable the derivation of a DNEL for carcinogenic effects.; Available hazard data do not enable the derivation of a DNEL for aspiration effects.; Available hazard data do not enable the derivation of a DNEL for dermal irritant effects.; Risk management measures are based on qualitative risk characterisation.</p> <p>CS1 RCR PROC 8b (Bulk transfers; Dedicated facility (PROC 8b))</p>			
Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.4 mg/m ³ (Measured data: Concauwe report no 13/18) Exposure/DNEL = 0.208 Supportive exposure (not used for RC): 0.244 mg/m ³ (TRA Workers) 1.6 mg/m ³ (Measured data: Concauwe report no 13/18)	Exposure/DNEL = 0.208
Inhalation, systemic, acute	Registered substance as such	125 mg/m ³ (TRA Workers) RCR = 0.097	Exposure/DNEL = 0.097
	Benzene	0.976 mg/m ³ (TRA Workers)	
Inhalation, local, long term	Registered substance as such	31.25 mg/m ³ (TRA Workers) RCR = 0.037	Final RCR = 0.037
Inhalation, local, acute	Registered substance as such	125 mg/m ³ (TRA Workers) RCR = 0.117	Final RCR = 0.117
Dermal, systemic, long term	Benzene	0.014 mg/kg bw/day (TRA Workers)	
Dermal, local, long term	Registered substance as such	0.1 mg/cm ² (TRA Workers)	
	Benzene	1E-3 mg/cm ² (TRA Workers)	

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Dermal, local, acute	Registered substance as such	0.1 mg/cm ² (TRA Workers)	
	Benzene	1E-3 mg/cm ² (TRA Workers)	
Combined routes, systemic, acute			Final RCR = 0.097

CS2 RCR PROC 8b (Drum/batch transfers; Dedicated facility)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.244 mg/m ³ (TRA Workers) Exposure/DNEL = 0.127	Exposure/DNEL = 0.127
Inhalation, systemic, acute	Registered substance as such	125 mg/m ³ (TRA Workers) RCR = 0.097	Exposure/DNEL = 0.097
	Benzene	0.976 mg/m ³ (TRA Workers)	
Inhalation, local, long term	Registered substance as such	31.25 mg/m ³ (TRA Workers) RCR = 0.037	Final RCR = 0.037
Inhalation, local, acute	Registered substance as such	125 mg/m ³ (TRA Workers) RCR = 0.117	Final RCR = 0.117
Dermal, systemic, long term	Benzene	0.014 mg/kg bw/day (TRA Workers)	
Dermal, local, long term	Registered substance as such	0.1 mg/cm ² (TRA Workers)	
	Benzene	1E-3 mg/cm ² (TRA Workers)	
Dermal, local, acute	Registered substance as such	0.1 mg/cm ² (TRA Workers)	
	Benzene	1E-3 mg/cm ² (TRA Workers)	
Combined routes, systemic, acute			Final RCR = 0.097

CS3 RCR PROC 1, PROC 2 (General exposures; Closed systems)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.57 mg/m ³ (TRA Workers) Exposure/DNEL = 0.297	Exposure/DNEL = 0.297
Inhalation, systemic, acute	Registered substance as such	291.7 mg/m ³ (TRA Workers) RCR = 0.227	Exposure/DNEL = 0.227
	Benzene	2.278 mg/m ³ (TRA Workers)	
Inhalation, local, long term	Registered substance as such	72.92 mg/m ³ (TRA Workers) RCR = 0.087	Final RCR = 0.087
Inhalation, local, acute	Registered substance as such	291.7 mg/m ³ (TRA Workers) RCR = 0.273	Final RCR = 0.273
Dermal, systemic, long term	Benzene	1.37E-3 mg/kg bw/day (TRA Workers)	

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Dermal, local, long term	Registered substance as such	0.02 mg/cm ² (TRA Workers)	
	Benzene	2E-4 mg/cm ² (TRA Workers)	
Dermal, local, acute	Registered substance as such	0.02 mg/cm ² (TRA Workers)	
	Benzene	2E-4 mg/cm ² (TRA Workers)	
Combined routes, systemic, acute			Final RCR = 0.227

CS4 RCR PROC 16 (Use of fuels; Closed systems)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.814 mg/m ³ (TRA Workers) Exposure/DNEL = 0.424	Exposure/DNEL = 0.424
Inhalation, systemic, acute	Registered substance as such	416.7 mg/m ³ (TRA Workers) RCR = 0.324	Exposure/DNEL = 0.324
	Benzene	3.255 mg/m ³ (TRA Workers)	
Inhalation, local, long term	Registered substance as such	72.92 mg/m ³ (TRA Workers) RCR = 0.087	Final RCR = 0.124
Inhalation, local, acute	Registered substance as such	104.2 mg/m ³ (TRA Workers) RCR = 0.124	Final RCR = 0.391
Dermal, systemic, long term	Benzene	3.4E-4 mg/kg bw/day (TRA Workers)	
Dermal, local, long term	Registered substance as such	9.92E-3 mg/cm ² (TRA Workers)	
	Benzene	9.92E-5 mg/cm ² (TRA Workers)	
Dermal, local, acute	Registered substance as such	9.92E-3 mg/cm ² (TRA Workers)	
	Benzene	9.92E-5 mg/cm ² (TRA Workers)	
Combined routes, systemic, acute			Final RCR = 0.324

CS5 RCR PROC 8a, PROC 28 (Equipment cleaning and maintenance)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.3 mg/m ³ (Measured data: Concauwe report no 13/18) Exposure/DNEL = 0.156 Supportive exposure (not used for RC): 0.57 mg/m ³ (TRA Workers)	Exposure/DNEL = 0.156
Inhalation, systemic, acute	Registered substance as such	291.7 mg/m ³ (TRA Workers) RCR = 0.227	Exposure/DNEL = 0.087

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	Benzene	2.278 mg/m ³ (TRA Workers)	
Inhalation, local, long term	Registered substance as such	72.92 mg/m ³ (TRA Workers) RCR = 0.087	Final RCR = 0.087
Inhalation, local, acute	Registered substance as such	291.7 mg/m ³ (TRA Workers) RCR = 0.273	Final RCR = 0.273
Dermal, systemic, long term	Benzene	0.014 mg/kg bw/day (TRA Workers)	
Dermal, local, long term	Registered substance as such	0.1 mg/cm ² (TRA Workers)	
	Benzene	1E-3 mg/cm ² (TRA Workers)	
Dermal, local, acute	Registered substance as such	0.1 mg/cm ² (TRA Workers)	
	Benzene	1E-3 mg/cm ² (TRA Workers)	
Combined routes, systemic, acute			Final RCR = 0.227

CS6 RCR PROC 1 PROC2 (Storage)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.814 mg/m ³ Exposure/DNEL = 0.424	Exposure/DNEL = 0.424
Inhalation, systemic, acute	Registered substance as such	416.7 mg/m ³ (TRA Workers) RCR = 0.324	Exposure/DNEL = 0.324
	Benzene	3.255 mg/m ³ (TRA Workers)	
Inhalation, local, long term	Registered substance as such	104.2 mg/m ³ (TRA Workers) RCR = 0.124	Final RCR = 0.124
Inhalation, local, acute	Registered substance as such	416.7 mg/m ³ (TRA Workers) RCR = 0.391	Final RCR = 0.391
Dermal, systemic, long term	Benzene	1,37E-3 mg/kg bw/day (TRA Workers)	
Dermal, local, long term	Registered substance as such	0,02 mg/cm ² TRA Workers)	
	Benzene	2E-4 mg/cm ² TRA Workers)	
Dermal, local, acute	Registered substance as such	0,02 mg/cm ² TRA Workers)	
	Benzene	2E-4 mg/cm ² (TRA Workers)	
Combined routes, systemic, acute			Final RCR = 0,324

4.2. Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. Required removal efficiency for air can be achieved using onsite technologies, either alone or in combination. Further details on scaling and control technologies are provided in SpERC factsheet (<http://cefic.org/en/reach-for-industries-libraries.html>).

Maximum Risk Characterisation Ratio for Air Emissions RCRair	3.0E-02
Maximum Risk Characterisation Ratio for Wastewater Emissions RCRwater	4.6E-01

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12b Widespread use by professional workers (classified; including H340 and/or H350 and/or H361; (containing 0% to 1% benzene) Closed systems

Section 1	
Title	
Use in fuels: Professional Closed systems	
Use Descriptor	
Sector(s) of Use	
Process Categories	1, 2, 8a, 8b, 16, 28
Environmental Release Categories	9a, 9b
Specific Environmental Release Category	ESVOC SpERC 9.12b.v1
Processes, tasks, activities covered	
Covers the use in fuels (or fuel additives and additive components) within closed or contained systems, including incidental exposures during activities associated with its transfer, use, equipment maintenance and handling of waste.	
Assessment Method	
See Section 3.	
Section 2 Operational conditions and risk management measures	
Section 2.1 Control of worker exposure	
Product characteristics	
Physical form of product	Liquid
Vapour pressure	Liquid, vapour pressure > 10 kPa at Standard Temperature and Pressure
Concentration of substance in product	Covers percentage substance in the product up to 100 %. (unless stated differently) Covers percentage benzene in the final product up to <1%
Frequency and duration of use/exposure	Covers daily exposures up to 8 hours (unless stated differently)
Other Operational Conditions affecting exposure	Assumes a good basic standard of occupational hygiene is implemented Covers use at ambient temperatures. (unless stated differently)
Contributing Scenarios	Specific Risk Management Measures and Operating Conditions
General measures (skin irritants)	Ensure that direct skin contact is avoided. Identify potential areas for indirect skin contact. Wear suitable gloves tested to EN374. Clear spills immediately. Wash off any skin contamination immediately. For further specification, refer to section 8 of the SDS.
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down and flush system prior to equipment break-in or maintenance. Access to work area only for authorised persons. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Wear suitable coveralls to prevent exposure to the skin. Wear respiratory protection when its use is identified for certain contributing scenarios. For further specification, refer to section 8 of the SDS. Clear spills immediately. Dispose of this material and its container at hazardous or special waste collection point. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Ensure control measures are regularly inspected and maintained. Consider the need for risk based health surveillance.
General measures (flammability)	For measures to control risks from physicochemical properties, refer to main body of the SDS, section 7 and/or 8.
General measures (aspiration hazard)	Do not ingest. If swallowed then seek immediate medical assistance.
CS1 Bulk transfers; Dedicated facility (PROC_8b)	Ensure material transfers are under containment or extract ventilation.

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CS2 Drum/batch transfers; Dedicated facility (PROC_8b)	Ensure material transfers are under containment or extract ventilation.
CS3 Refuelling (PROC_8b)	Ensure material transfers are under containment or extract ventilation.
CS4 General exposures; Closed systems (PROC_2, PROC_1)	Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure.
CS5 Use of fuels; Closed systems (PROC_16)	Handle substance within a closed system.
CS6 Equipment cleaning and maintenance (PROC_8a, PROC_28)	Covers use up to 4.0 h/day Drain down and flush system prior to equipment break-in or maintenance. Wear a respirator conforming to EN140. Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Wear suitable coveralls to prevent exposure to the skin. Clear spills immediately.
CS7 Storage (PROC_2, PROC_1)	Store substance within a closed system.
Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is complex UVCB. Predominantly hydrophobic	
Amounts used	
Fraction of EU tonnage used in region	0.1
Regional use tonnage (tonnes/year)	9.1E+05
Fraction of Regional tonnage used locally	5.0E-04
Annual site tonnage (tonnes/year)	4.5E+02
Maximum daily site tonnage (kg/day)	1.2E+03
Frequency and duration of use	
Continuous release .	
Emission days (days/year)	365
Environmental factors not influenced by risk management	
Local freshwater dilution factor	10
Local marine water dilution factor	100
Other given operational conditions affecting environmental exposure	
Release fraction to air from wide dispersive use (regional use only)	5.0E-03
Release fraction to wastewater from wide dispersive use	1.0E-06
Release fraction to soil from wide dispersive use (regional use only)	0.00025
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	
Risk from environmental exposure is driven by humans via indirect exposure (primarily inhalation). No wastewater treatment required	
Treat air emission to provide a typical removal efficiency of (%)	N/A
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency >= (%)	0.0
If discharging to domestic sewage treatment plant. provide the required onsite wastewater removal efficiency of >= (%)	0.0
Organisation measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated. contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Not applicable as there is no release to wastewater.	
Estimated substance removal from wastewater via domestic sewage treatment (%)	96.1
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	96.1
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	5.2E+04
Assumed domestic sewage treatment plant flow (m3/d)	2.0E+03

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Conditions and measures related to external treatment of waste for disposal			
Combustion emissions limited by required exhaust emission controls. Combustion emissions considered in regional exposure assessment. External treatment and disposal of waste should comply with applicable local and/or national regulations.			
Conditions and measures related to external recovery of waste			
This substance is consumed during use and no waste of the substance is generated.			
Section 3 Exposure Estimation			
3.1. Health			
The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.			
3.2. Environment			
The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model			
Section 4 Guidance to check compliance with the Exposure Scenario			
4.1. Health			
Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented.; Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.; Available hazard data do not enable the derivation of a DNEL for carcinogenic effects.; Available hazard data do not enable the derivation of a DNEL for aspiration effects.; Available hazard data do not enable the derivation of a DNEL for dermal irritant effects.; Risk management measures are based on qualitative risk characterisation.			
CS1 RCR PROC 8b (Bulk transfers; Dedicated facility)			
Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	1.6 mg/m ³ (Measured data: Concawe report no 13/18) Exposure/DNEL = 0.833 Supportive exposure (not used for RC): 0.814 mg/m ³ (TRA Workers)	Exposure/DNEL = 0.833
Inhalation, systemic, acute	Registered substance as such	416.7 mg/m ³ (TRA Workers) RCR = 0.324	Exposure/DNEL = 0.324
	Benzene	3.255 mg/m ³ (TRA Workers)	
Inhalation, local, long term	Registered substance as such	104.2 mg/m ³ (TRA Workers) RCR = 0.124	Final RCR = 0.124
Inhalation, local, Acute	Registered substance as such	416.7 mg/m ³ (TRA Workers) RCR = 0.391	Final RCR = 0.391
Dermal, systemic, long term	Benzene	0.014 mg/kg bw/day (TRA Workers)	
Dermal, local, long term	Registered substance as such	0.1 mg/cm ² (TRA Workers)	
	Benzene	1E-3 mg/cm ² (TRA Workers)	
Dermal, local, acute	Registered substance as such	0.1 mg/cm ² (TRA Workers)	
	Benzene	1E-3 mg/cm ² (TRA Workers)	
Combined routes, systemic, acute			Final RCR = 0.324

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CS2 RCR PROC 8b (Drum/batch transfers; Dedicated facility)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.814 mg/m ³ (TRA Workers) Exposure/DNEL = 0.424 Supportive exposure (not used for RC): 0.4 mg/m ³ (Measured data: Concauwe report no 13/18) 51 µg/m ³ (Measured data: Karakitsios et al (2007))	Exposure/DNEL = 0.424
Inhalation, systemic, acute	Registered substance as such	416.7 mg/m ³ (TRA Workers) RCR = 0.324	Exposure/DNEL = 0.324
	Benzene	3.255 mg/m ³ (TRA Workers)	
Inhalation, local, long term	Registered substance as such	104.2 mg/m ³ (TRA Workers) RCR = 0.124	Final RCR = 0.124
Inhalation, local, acute	Registered substance as such	416.7 mg/m ³ (TRA Workers) RCR = 0.391	Final RCR = 0.391
Dermal, systemic, long term	Benzene	0.014 mg/kg bw/day (TRA Workers)	
Dermal, local, long term	Registered substance as such	0.1 mg/cm ² (TRA Workers)	
	Benzene	1E-3 mg/cm ² (TRA Workers)	
Dermal, local, acute	Registered substance as such	0.1 mg/cm ² (TRA Workers)	
	Benzene	1E-3 mg/cm ² (TRA Workers)	
Combined routes, systemic, acute			Final RCR = 0.324

CS3 RCR PROC 8b (Refuelling)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.814 mg/m ³ (TRA Workers) Exposure/DNEL = 0.424 Supportive exposure (not used for RC): 0.4 mg/m ³ (Measured data: Concauwe report no 13/18) 51 µg/m ³ (Measured data: Karakitsios et al (2007))	Exposure/DNEL = 0.424

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Inhalation, systemic, acute	Registered substance as such	416.7 mg/m ³ (TRA Workers) RCR = 0.324	Exposure/DNEL = 0.324
	Benzene	3.255 mg/m ³ (TRA Workers)	
Inhalation, local, long term	Registered substance as such	104.2 mg/m ³ (TRA Workers) RCR = 0.124	Final RCR = 0.124
Inhalation, local, acute	Registered substance as such	416.7 mg/m ³ (TRA Workers) RCR = 0.391	Final RCR = 0.391
Dermal, systemic, long term	Benzene	0.014 mg/kg bw/day (TRA Workers)	
Dermal, local, long term	Registered substance as such	0.1 mg/cm ² (TRA Workers)	
	Benzene	1E-3 mg/cm ² (TRA Workers)	
Dermal, local, acute	Registered substance as such	0.1 mg/cm ² (TRA Workers)	
	Benzene	1E-3 mg/cm ² (TRA Workers)	
Combined routes, systemic, acute			Final RCR = 0.324

CS4 RCR PROC 2, PROC 1 (General exposures; Closed systems)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	1.627 mg/m ³ (TRA Workers) Exposure/DNEL = 0.848	Exposure/DNEL = 0.848
Inhalation, systemic, acute	Registered substance as such	833.3 mg/m ³ (TRA Workers) RCR = 0.648	Exposure/DNEL = 0.648
	Benzene	6.509 mg/m ³ (TRA Workers)	
Inhalation, local, long term	Registered substance as such	208.3 mg/m ³ (TRA Workers) RCR = 0.249	Final RCR = 0.249
Inhalation, local, Acute	Registered substance as such	833.3 mg/m ³ (TRA Workers) RCR = 0.781	Final RCR = 0.781
Dermal, systemic, long term	Benzene	1.37E-3 mg/kg bw/day (TRA Workers)	
Dermal, local, long term	Registered substance as such	0.02 mg/cm ² (TRA Workers)	
	Benzene	2E-4 mg/cm ² (TRA Workers)	
Dermal, local, acute	Registered substance as such	0.02 mg/cm ² (TRA Workers)	
	Benzene	2E-4 mg/cm ² (TRA Workers)	
Combined routes, systemic, acute			Final RCR = 0.324

CS 5 RCR PROC 16 (Use of fuels; Closed systems)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification

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Inhalation, systemic, long term	Benzene	1.627 mg/m ³ (TRA Workers) Exposure/DNEL = 0.848	Exposure/DNEL = 0.848
Inhalation, systemic, acute	Registered substance as such	833.3 mg/m ³ (TRA Workers) RCR = 0.648	Exposure/DNEL = 0.648
	Benzene	6.509 mg/m ³ (TRA Workers)	
Inhalation, local, long term	Registered substance as such	208.3 mg/m ³ (TRA Workers) RCR = 0.249	Final RCR = 0.249
Inhalation, local, acute	Registered substance as such	833.3 mg/m ³ (TRA Workers) RCR = 0.781	Final RCR = 0.781
Dermal, systemic, long term	Benzene	3.4E-4 mg/kg bw/day (TRA Workers)	
Dermal, local, long term	Registered substance as such	9.92E-3 mg/cm ² (TRA Workers)	
	Benzene	9.92E-5 mg/cm ² (TRA Workers)	
Dermal, local, acute	Registered substance as such	9.92E-3 mg/cm ² (TRA Workers)	
	Benzene	9.92E-5 mg/cm ² (TRA Workers)	
Combined routes, systemic, acute			Final RCR = 0.648

CS 6 RCR PROC 8a, PROC 28 (Equipment cleaning and maintenance)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	0.195 mg/m ³ (TRA Workers) Exposure/DNEL = 0.102 Supportive exposure (not used for RC): 0.026 mg/m ³ (Measured data: Concawe report no 13/18) 0.054 mg/m ³ (Measured data: Vainiotalo et al (2006))	Exposure/DNEL = 0.102
Inhalation, systemic, acute	Registered substance as such	166.7 mg/m ³ (TRA Workers) RCR = 0.13	Exposure/DNEL = 0.13
	Benzene	1.302 mg/m ³ (TRA Workers)	
Inhalation, local, long term	Registered substance as such	25 mg/m ³ (TRA Workers) RCR = 0.03	Final RCR = 0.03
Inhalation, local, acute	Registered substance as such	166.7 mg/m ³ (TRA Workers) RCR = 0.156	Final RCR = 0.156
Dermal, systemic, long term	Benzene	8.23E-3 mg/kg bw/day (TRA Workers)	

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Dermal, local, long term	Registered substance as such	0.06 mg/cm ² (TRA Workers)	
	Benzene	6E-4 mg/cm ² (TRA Workers)	
Dermal, local, acute	Registered substance as such	0.06 mg/cm ² (TRA Workers)	
	Benzene	6E-4 mg/cm ² (TRA Workers)	
Combined routes, systemic, acute			Final RCR = 0.13

CS7 RCR PROC 1 PROC2 (Storage)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	1,627 mg/m ³ Exposure/DNEL = 0.848	Exposure/DNEL = 0.848
Inhalation, systemic, acute	Registered substance as such	833.3 mg/m ³ (TRA Workers) RCR = 0,648	Exposure/DNEL = 0.648
	Benzene	6.509 mg/m ³ (TRA Workers)	
Inhalation, local, long term	Registered substance as such	208.3 mg/m ³ (TRA Workers) RCR = 0.249	Final RCR = 0.249
Inhalation, local, acute	Registered substance as such	833.3 mg/m ³ (TRA Workers) RCR = 0.781	Final RCR = 0.781
Dermal, systemic, long term	Benzene	1.37E-3 mg/kg bw/day (TRA Workers)	
Dermal, local, long term	Registered substance as such	0.02 mg/cm ² TRA Workers)	
	Benzene	2E-4 mg/cm ² TRA Workers)	
Dermal, local, acute	Registered substance as such	0.02 mg/cm ² TRA Workers)	
	Benzene	2E-4 mg/cm ² (TRA Workers)	
Combined routes, systemic, acute			Final RCR = 0,648

4.2. Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. Required removal efficiency for air can be achieved using onsite technologies, either alone or in combination. Further details on scaling and control technologies are provided in SpERC factsheet (<http://cefic.org/en/reach-for-industries-libraries.html>).

Maximum Risk Characterisation Ratio for Air Emissions RCRair	2.1E-02
Maximum Risk Characterisation Ratio for Wastewater Emissions RCRwater	1.8E-02

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12c Use in fuels: Consumer (classified; including H340 and/or H350 and/or H361; (containing 0% to 1% benzene)

Note: The benzene concentration is further aligned with Directive 98/70/EC of the European Parliament and of the Council of 13 October 1998 relating to the quality of petrol and diesel fuels.

Section 1	
Title	
12c - Use in fuels: Consumer	
Use Descriptor	
Sector(s) of Use	
Product Categories	13
Environmental Release Categories	9a, 9b
Specific Environmental Release Category	ESVOC SpERC 9.12c.v1
Processes, tasks, activities covered	
Covers consumer uses in liquid fuels.	
Assessment Method	
See Section 3.	
Section 2 Operational conditions and risk management measures	
Section 2.1 Control of consumer exposure	
Product characteristics	
Physical form of product	Liquid
Vapour pressure	-
Concentration of substance in product	-
Frequency and duration of use/exposure	Covers use up to 1.0 events per day
Other Operational Conditions affecting exposure	-
Product Category	Specific Risk Management Measures and Operating Conditions
General measures (skin irritants)	Ensure there is no direct skin contact with product; Remove accidental skin contamination.
General measures (flammability)	For measures to control risks from physicochemical properties, refer to main body of the SDS, section 7 and/or 8.
General measures (aspiration hazard)	Do not ingest. If swallowed then seek immediate medical assistance.
Fuels; Liquid; Automotive refuelling; (; Gasoline) (PC_13) Based on Concawe_SCED_13_1_a	Covers concentrations up to 100 %; Covers percentage benzene in the final product up to <1%. For each use event, covers use amounts up to 37500.0 g/event Exposure duration = 0.05 h/event Outdoor use Assumes that potential dermal contact is limited to palm of one hand
Fuels; Liquid; Recreational vehicles; (; Quad bikes or similar) (PC_13) Based on Concawe_SCED_13_7_a	Covers concentrations up to 100 %; Covers percentage benzene in the final product up to <1%. For each use event, covers use amounts up to 7500.0 g/event. Exposure duration = 0.017 h/event. Outdoor use Assumes that potential dermal contact is limited to palm of one hand
Fuels; Liquid; Garden equipment (PC_13) Based on Concawe_SCED_13_4_a	Covers concentrations up to 100 %; Covers percentage benzene in the final product up to <0.1%;Covers percentage n-hexane in the final product up to <3%;Covers percentage toluene in the final product up to <3%. For each use event, covers use amounts up to 750.0 g/event Exposure duration = 0.033 h/event Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is complex UVCB. Predominantly hydrophobic	

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Amounts used			
Fraction of EU tonnage used in region	0.1		
Regional use tonnage (tonnes/year)	8.1E+06		
Fraction of Regional tonnage used locally	5.0E-04		
Annual site tonnage (tonnes/year)	4.1E+03		
Maximum daily site tonnage (kg/day)	1.1E+04		
Frequency and duration of use			
Continuous release			
Emission days (days/year)	365		
Environmental factors not influenced by risk management			
Local freshwater dilution factor	10		
Local marine water dilution factor	100		
Other given operational conditions affecting environmental exposure			
Release fraction to air from wide dispersive use (regional use only)	4.0E-03		
Release fraction to wastewater from wide dispersive use	2.0E-07		
Release fraction to soil from wide dispersive use (regional use only)	0.00005		
Conditions and measures related to municipal sewage treatment plant			
Not applicable as there is no release to wastewater.			
Estimated substance removal from wastewater via domestic sewage treatment (%)	96.1		
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	4.6E+05		
Assumed domestic sewage treatment plant flow (m3/d)	2.0E+03		
Conditions and measures related to external treatment of waste for disposal			
Combustion emissions limited by required exhaust emission controls. Combustion emissions considered in regional exposure assessment. External treatment and disposal of waste should comply with applicable local and/or national regulations.			
Conditions and measures related to external recovery of waste			
This substance is consumed during use and no waste of the substance is generated.			
Section 3 Exposure Estimation			
3.1. Health			
The ECETOC TRA tool has been used to estimate consumer exposures unless otherwise indicated.			
3.2. Environment			
The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].			
Section 4 Guidance to check compliance with the Exposure Scenario			
4.1. Health			
<p>Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented;</p> <p>Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.;</p> <p>Available hazard data do not enable the derivation of a DNEL for aspiration effects.;</p> <p>Available hazard data do not enable the derivation of a DNEL for dermal irritant effects.;</p> <p>Risk management measures are based on qualitative risk characterisation.</p> <p>CS1 RCR PC 13 (Liquid; Automotive refuelling)</p>			
Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	6.98E-3 mg/m ³ (Measured data: Vainiotalo et al (1999); Moneti et al (2002); Minoia et al (2002); Clayton et al (1991)) Exposure/DNEL = 0.017	Exposure/DNEL = 0.017

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		Supportive exposure (not used for RC): 0.014 mg/m ³ (TRA Consumers)	
Inhalation, systemic, acute	Registered substance as such	56.09 mg/m ³ (Measured data: Hakkola and Saarinen 2000) RCR = 0.049 Supportive exposure (not used for RC): 133.3 mg/m ³ (ECETOC TRA Consumers 3.1)	Exposure/DNEL = 0.049
Inhalation, local, long term	Registered substance as such	0.584 mg/m ³ (Measured data: Hakkola and Saarinen 2000) RCR = 3.27E-3 Supportive exposure (not used for RC): 1.389 mg/m ³ (TRA Consumers)	Final RCR < 0.01
Inhalation, local, acute	Registered substance as such	56.09 mg/m ³ (Measured data: Hakkola and Saarinen 2000) RCR = 0.088 Supportive exposure (not used for RC): 133.3 mg/m ³ (ECETOC TRA Consumers 3.1)	Final RCR = 0.088
Dermal, systemic, long term	Benzene	7E-4 mg/kg bw/day (TRA Consumers))	
Oral, systemic, long term	Benzene	0 mg/kg bw/day (TRA Consumers)	
Combined routes, systemic, acute			Final RCR = 0.049

CS2 RCR PC 13 (Liquid; Recreational vehicles)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Benzene	5E-3 mg/m ³ (TRA Consumers) Exposure/DNEL = 0.012	Exposure/DNEL = 0.012
Inhalation, systemic, acute	Registered substance as such	47.96 mg/m ³ (ECETOC TRA Consumers 3.1) RCR = 0.042	Exposure/DNEL = 0.042
Inhalation, local, long term	Registered substance as such	0.5 mg/m ³ (TRA Consumers) RCR = 2.8E-3	Final RCR < 0.01
Inhalation, local, acute	Registered substance as such	47.96 mg/m ³ (ECETOC TRA Consumers 3.1) RCR = 0.075	Final RCR = 0.075
Dermal, systemic, long term	Benzene	3.5E-3 mg/kg bw/day (TRA Consumers)	

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+Oral, systemic, long term	Benzene	0 mg/kg bw/day (TRA Consumers)	
Combined routes, systemic, acute			Final RCR = 0.042
CS3 RCR PC 13 (Liquid; Garden equipment)			
Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, acute	Registered substance as such	146.7 mg/m ³ (ECETOC TRA Consumers 3.1) RCR = 0.127	Exposure/DNEL = 0.127
Inhalation, local, long term	Registered substance as such	1.532 mg/m ³ (TRA Consumers) RCR = 8.58E-3	Final RCR < 0.01
Inhalation, local, acute	Registered substance as such	146.7 mg/m ³ (ECETOC TRA Consumers 3.1) RCR = 0.229	Final RCR = 0.229
Combined routes, systemic, acute			Final RCR = 0.127
4.2. Environment			
Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.			
Maximum Risk Characterisation Ratio for Air Emissions RCR _{air}			2.1E-02
Maximum Risk Characterisation Ratio for Wastewater Emissions RCR _{water}			1.8E-02

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ETBE

1 Use as a fuel – Industrial Sector

Section 1 Exposure Scenario	
Title	
Use as a fuel	
Use Descriptor	
Sector(s) of Use	Industrial (SU3)
Process Categories	1, 2, 3, 8a, 8b, 16
Environmental Release Categories	8b
Specific Environmental Release Category	ESVOC3 SpERC
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.	
Section 2 Operational conditions and risk management measures	
Section 2.1 Control of worker exposure	
Product characteristics	
Physical form of product	Liquid, vapour pressure > 10 kPa [OC5].
Concentration of substance in product	Covers percentage substance in the product up to 15% [Gnew].
Amount used	Not applicable
Frequency and duration of use/exposure	Covers daily exposures up to 8 hours (unless stated differently) [G2]
Human factors not influenced by risk management	Not applicable
Other Operational Conditions Affecting Exposure	Assumes a good basic standard of occupational hygiene is implemented [G1].
Contributing Scenarios	Specific Risk Management Measures and Operating Conditions
Bulk transfers [CS14].; Batch process [CS55]. With sample collection [CS56]. ; Filling / preparation of equipment from drums or containers. [CS45].	Handle substance within a predominantly closed system provided with extract ventilation [E49]. Avoid carrying out activities involving exposure for more than 4 hours [OC28], or: Wear a respirator conforming to EN140 with Type A filter or better. [PPE22]
Drum/batch transfers [CS8]. ; Filling / preparation of equipment from drums or containers. [CS45]. Bulk transfers [CS14]. ; Dedicated facility [CS81]	Use drum pumps [E53].
General exposures (closed systems) [CS15].	No specific measures identified [E18].
General exposures (closed systems) [CS15]. ; With sample collection [CS56].	Provide extract ventilation to material transfer points and other openings [E82].
General exposures (closed systems) [CS15]. ; Use in contained batch processes [CS37]. ; With sample collection [CS56].	Provide extract ventilation to points where emissions occur [E54].

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(closed systems) [CS107] U of fuel	No specific measures identified [E18].
(closed systems) [CS107] Btch process [CS55].	Provide extract ventilation to material transfer points and other openings [E82].
Equipment cleaning and maintenance [CS39]. Non-dedicated facility [CS82]e.g. fuel pump repair indoor	Drain down system prior to equipment break-in or maintenance [E65].Avoid carrying out activities involving exposure for more than 4 hours [OC28]
Storage [CS67]; General exposures (closed systems) [CS15].	No specific measures identified [E18].
Storage [CS67]; General exposures (closed systems) [CS15]. ; With sample collection [CS56].	Ensure operation is undertaken outdoors [E69].
Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is a unique structure [PrC1]. Predominantly hydrophobic [PrC4a]. Readily biodegradable [PrC5a].	
Operational condition	
Outdoor use [OOC1].	
Amount used	
Regional use tonnage (tonnes/year) [A2]:	901,000
Fraction of regional tonnage used locally [A3]:	0.02
Average local daily tonnage (kg/d) [A5]:	51,486
Annual site tonnage (tonnes/year) [A6]	18,020
Frequency and duration of use	
Continuous release [FD2].	
Emission days (days/year)	350
Other given operational conditions affecting environmental exposure	
Use in closed systems. Either wet or dry processes.	
Release fraction to air from process:	1.00E-04
Release fraction to wastewater from process:	1.00E-05
Release fraction to soil from process (regional only):	1.00E-05
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used [TCS 1].	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Air:	No air emission controls required; required removal efficiency is 0% [TCR5].
Wastewater:	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of >95% [TCR9].
Soil:	No soil emission controls required; required removal efficiency is 0% [TCR7].
Organisation measures to prevent/limit release from site	
Prevent discharge of undissolved substance to or recover from wastewater [OMS1].	
Conditions and measures related to municipal sewage treatment plant	
Assumed industrial sewage treatment plant effluent flow is 2000 m3/d.	
Conditions and measures related to external treatment of waste for disposal	
Not applicable	
Conditions and measures related to external recovery of waste	
Not applicable	
Other environmental control measures additional to above	
None	

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2 Use as a fuel – Professional Sector

Section 1 Exposure Scenario	
Title	
Use as a fuel	
Use Descriptor	
Sector(s) of Use	Professional (SU22)
Process Categories	1, 2, 3, 8a, 8b, 9, 16
Environmental Release Categories	8b, 8e
Specific Environmental Release Category	ESVOC30 SpERC
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.	
Section 2 Operational conditions and risk management measures	
Section 2.1 Control of worker exposure	
Product characteristics	
Physical form of product	Liquid, vapour pressure > 10 kPa [OC5].
Concentration of substance in product	Covers percentage substance in the product up to 15% [Gnew].
Amount used	Not applicable
Frequency and duration of use/exposure	Covers daily exposures up to 8 hours (unless stated differently) [G2]
Human factors not influenced by risk management	Not applicable
Other Operational Conditions Affecting Exposure	Assumes a good basic standard of occupational hygiene is implemented [G1].
Contributing Scenarios	Specific Risk Management Measures and Operating Conditions
Bulk transfers [CS14]. ; Batch process [CS55]. Filling / preparation of equipment from drums or containers. [CS45].	Ensure operation is undertaken outdoors [E69]. Avoid carrying out activities involving exposure for more than 4 hours [OC28], or: Wear a respirator conforming to EN140 with Type A filter or better. [PPE22].
Drum/batch transfers [CS8]. ; Filling / preparation of equipment from drums or containers. [CS45]. Bulk transfers [CS14]. ; Dedicated facility [CS81]	Ensure operation is undertaken outdoors [E69]. ; Ensure material transfers are under containment or extract ventilation [E66].
Refuelling [CS507]	Provide a good standard of controlled ventilation (10 to 15 air changes per hour) [E40]. Avoid carrying out activities involving exposure for more than 1 hour [OC27], or: Wear a respirator conforming to EN140 with Type A filter or better. [PPE22].
General exposures (closed systems) [CS15]. ; With sample collection [CS56].	Avoid carrying out activities involving exposure for more than 4 hours [OC28], or: Wear a respirator conforming to EN140 with Type A filter or better. [PPE22]
General exposures (closed systems) [CS15]. ; Use in contained batch processes [CS37]. ; with sample collection [CS56].	Provide a good standard of controlled ventilation (10 to 15 air changes per hour) [E40].
Drum and small package filling [CS6]. Dedicated facility [CS81]	Use drum pumps or carefully pour from container [E64]. Avoid carrying out activities involving exposure for more than 4 hours [OC28], or: Wear a respirator conforming to EN140 with Type A filter or better. [PPE22]

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(closed systems) [CS107]use a fuel	Ensure operation is undertaken outdoors [E69]. , or: Provide a good standard of controlled ventilation (10 to 15 air changes per hour) [E40].
Equipment cleaning and maintenance [CS39]. Non-dedicated facility [CS82]e.g fuel pump repair indoor	Drain down and flush system prior to equipment break-in or maintenance [E55].Avoid carrying out activities involving exposure for more than 4 hours [OC28], or: Wear a respirator conforming to EN140 with Type A filter or better. [PPE22].
Equipment cleaning and maintenance [CS39]. Non-dedicated facility [CS82]e.g fuel pump repair outdoor	Drain down and flush system prior to equipment break-in or maintenance [E55].Avoid carrying out activities involving exposure for more than 4 hours [OC28], or: Wear a respirator conforming to EN140 with Type A filter or better. [PPE22]
Storage [CS67]; General exposures (closed systems) [CS15].	No specific measures identified [E18].
Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is a unique structure [PrC1]. Predominantly hydrophobic [PrC4a]. Readily biodegradable [PrC5a].	
Operational condition	
Outdoor use [OOC1].	
Amount used	
Average daily use over a year for wide dispersive use (kg/d):	4.94
Frequency and duration of use	
Dispersive use [FD3].	
Emission days (days/year)	365
Other given operational conditions affecting environmental exposure	
Use in open systems.	
Release fraction to air from wide dispersive use (regional only):	1.00E-02
Release fraction to wastewater from wide dispersive use:	1.00E-05
Release fraction to surface water from wide dispersive use (regional only):	1.00E-04
Release fraction to soil from wide dispersive use (regional only):	1.00E-05
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used [TCS 1].	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Air:	No air emission controls required; required removal efficiency is 0% [TCR5].
Wastewater:	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of >95% [TCR9].
Soil:	No soil emission controls required; required removal efficiency is 0% [TCR7].
Organisation measures to prevent/limit release from site	
Prevent discharge of undissolved substance to or recover from wastewater [OMS1].	
Conditions and measures related to municipal sewage treatment plant	
Assumed industrial sewage treatment plant effluent flow is 2000 m3/d.	
Conditions and measures related to external treatment of waste for disposal	
Not applicable	
Conditions and measures related to external recovery of waste	
Not applicable	
Other environmental control measures additional to above	
None	

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3 Use as a fuel – Consumer

Section 1 Exposure Scenario		
Title		
Use as a fuel		
Use Descriptor		
Sector(s) of Use	Consumer (SU21)	
Product Categories	13	
Environmental Release Categories	8d	
Specific Environmental Release Category	ESVOC30 SpERC	
Processes, tasks, activities covered		
Use of fuel for refuelling 2-stroke and 4-stroke engines		
Section 2 Operational conditions and risk management measures		
Section 2.1 Control of worker exposure		
Product characteristics		
Physical form of product	Liquid, vapour pressure > 10 kPa [OC5].	
Vapour pressure	170 hPa at 25 °C	
Concentration of substance in product	Covers percentage substance in the product up to 15% [Gnew].	
Amount used	Up to 60 litres per refuelling	
Frequency and duration of use/exposure	Up to 3 times a week	
Other Operational Conditions Affecting Exposure	Unless otherwise stated assumes use at ambient temperatures [ConsOC15]	
Contributing Scenarios		Specific Risk Management Measures and Operating Conditions
PC13: Fuel	OC	Unless otherwise stated, covers concentrations up to 15% [ConsOC1]; covers use up to 150 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers exposure up to 15 min/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
Section 2.2 Control of environmental exposure		
Product characteristics		
Substance is a unique structure [PrC1]. Predominantly hydrophobic [PrC4a]. Readily biodegradable [PrC5a].		
Operational condition		
Indoor/Outdoor use [OOC3].		
Amount used		
Average daily use over a year for wide dispersive use (kg/d):	4.94	
Frequency and duration of use		
Dispersive use [FD3].		
Emission days (days/year)	365	
Other given operational conditions affecting environmental exposure		
Use in open systems.		
Release fraction to air from wide dispersive use (regional only):	1.00E-02	
Release fraction to wastewater from wide dispersive use:	1.00E-05	
Release fraction to surface water from wide dispersive use (regional only):	1.00E-04	
Release fraction to soil from wide dispersive use (regional only):	1.00E-05	
Technical conditions and measures at process level (source) to prevent release		
Common practices vary across sites thus conservative process release estimates used [TCS 1].		
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil		
Air:	No air emission controls required; required removal efficiency is 0% [TCR5].	

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Wastewater:	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of >95% [TCR9].
Soil:	No soil emission controls required; required removal efficiency is 0% [TCR7].
Organisation measures to prevent/limit release from site	
Prevent discharge of undissolved substance to or recover from wastewater [OMS1].	
Conditions and measures related to municipal sewage treatment plant	
Assumed industrial sewage treatment plant effluent flow is 2000 m3/d.	
Conditions and measures related to external treatment of waste for disposal	
Not applicable	
Conditions and measures related to external recovery of waste	
Not applicable	
Other environmental control measures additional to above	
None	

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MTBE

1 Use as a fuel – Industrial Sector

Section 1 Exposure Scenario	
Title	
Use as a fuel	
Use Descriptor	
Sector(s) of Use	Industrial (SU3)
Process Categories	1, 2, 3, 8a, 8b, 16
Environmental Release Categories	8b
Specific Environmental Release Category	ESVOC3 SpERC
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.	
Section 2 Operational conditions and risk management measures	
Section 2.1 Control of worker exposure	
Product characteristics	
Physical form of product	Liquid, vapour pressure > 10 kPa [OC5].
Concentration of substance in product	Covers percentage substance in the product up to 15% [Gnew].
Amount used	Not applicable
Frequency and duration of use/exposure	Covers daily exposures up to 8 hours (unless stated differently) [G2]
Human factors not influenced by risk management	Not applicable
Other Operational Conditions Affecting Exposure	Assumes a good basic standard of occupational hygiene is implemented [G1].
Contributing Scenarios	Specific Risk Management Measures and Operating Conditions
General measures (skin irritants) [G19].	Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wear gloves (tested to EN374) if hand contamination likely, wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop [E3].
Bulk transfers [CS14]. ; Batch process [CS55]. With sample collection [CS56]. ; Filling / preparation of equipment from drums or containers. [CS45].	Ensure material transfers are under containment or extract ventilation [E66].
Drum/batch transfers [CS8]. ; Filling / preparation of equipment from drums or containers. [CS45]. Bulk transfers [CS14]. ; Dedicated facility [CS81]	Use drum pumps [E53].
General exposures (closed systems) [CS15].	No specific measures identified [E18].
General exposures (closed systems) [CS15]. ; With sample collection [CS56].	No specific measures identified [E18].

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General exposures (closed systems) [CS15]; Use in contained batch processes [CS37]. ; With sample collection [CS56].	Avoid carrying out activities involving exposure for more than 4 hours [OC28], or: Wear a respirator conforming to EN140 with Type A filter or better. [PPE22]
(closed systems) [CS107] Use of fuel	No specific measures identified [EI18].
(closed systems) [CS107] Batch process [CS55].	Avoid carrying out activities involving exposure for more than 4 hours [OC28], or: Wear a respirator conforming to EN140 with Type A filter or better. [PPE22]
Equipment cleaning and maintenance [CS39]. Non-dedicated facility [CS82] e.g fuel pump repair indoor	Avoid carrying out activities involving exposure for more than 4 hours [OC28] Wear a respirator conforming to EN140 with Type A filter or better. [PPE22]
Storage [CS67]; General exposures (closed systems) [CS15].	No specific measures identified [EI18].
Storage [CS67]; General exposures (closed systems) [CS15].With sample collection [CS56].	Ensure operation is undertaken outdoors [E69].
Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is a unique structure [PrC1]. Predominantly hydrophobic [PrC4a]. Readily biodegradable [PrC5a].	
Operational condition	
Outdoor use [OOC1].	
Amount used	
Fraction of EU tonnage used in region [A1]:	0.57
Regional use tonnage (tonnes/year) [A2]:	659,000
Fraction of regional tonnage used locally [A3]:	0.02
Average local daily tonnage (kg/d) [A5]:	37,657
Annual site tonnage (tonnes/year) [A6]	13,180
Frequency and duration of use	
Continuous release [FD2].	
Emission days (days/year)	350
Other given operational conditions affecting environmental exposure	
Use in closed systems. Either wet or dry processes.	
Release fraction to air from process:	1.00E-04
Release fraction to wastewater from process:	1.00E-05
Release fraction to soil from process (regional only):	1.00E-05
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used [TCS 1].	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Air:	No air emission controls required; required removal efficiency is 0% [TCR5].
Wastewater:	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of >95% [TCR9].
Soil:	No soil emission controls required; required removal efficiency is 0% [TCR7].
Organisation measures to prevent/limit release from site	
Prevent discharge of undissolved substance to or recover from wastewater [OMS1].	
Conditions and measures related to municipal sewage treatment plant	
Assumed industrial sewage treatment plant effluent flow is 2000 m3/d.	
Conditions and measures related to external treatment of waste for disposal	
Not applicable	

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Conditions and measures related to external recovery of waste
Not applicable
Other environmental control measures additional to above
None

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2 Use as a fuel – Professional Sector

Section 1 Exposure Scenario	
Title	
Use as a fuel	
Use Descriptor	
Sector(s) of Use	Professional (SU22)
Process Categories	1, 2, 3, 8a, 8b, 9, 16
Environmental Release Categories	8b, 8e
Specific Environmental Release Category	ESVOC30 SpERC
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.	
Section 2 Operational conditions and risk management measures	
Section 2.1 Control of worker exposure	
Product characteristics	
Physical form of product	Liquid, vapour pressure > 10 kPa [OC5].
Concentration of substance in product	Covers percentage substance in the product up to 15% [Gnew].
Amount used	Not applicable
Frequency and duration of use/exposure	Covers daily exposures up to 8 hours (unless stated differently) [G2]
Human factors not influenced by risk management	Not applicable
Other Operational Conditions Affecting Exposure	Assumes a good basic standard of occupational hygiene is implemented [G1].
Contributing Scenarios	Specific Risk Management Measures and Operating Conditions
General measures (skin irritants) [G19].	Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wear gloves (tested to EN374) if hand contamination likely, wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop [E3].
Bulk transfers [CS14]. ; Batch process [CS55]. Filling / preparation of equipment from drums or containers. [CS45].	Ensure material transfers are under containment or extract ventilation [E66].
Drum/batch transfers [CS8]. ; Filling / preparation of equipment from drums or containers. [CS45]. Bulk transfers [CS14]. ; Dedicated facility [CS81]	Ensure material transfers are under containment or extract ventilation [E66].
Refuelling [CS507]	Provide a good standard of controlled ventilation (10 to 15 air changes per hour) [E40].
General exposures (closed systems) [CS15]. ; With sample collection [CS56].	No specific measures identified [E18].
General exposures (closed systems) [CS15]. ; Use in contained batch processes [CS37]. ; With sample collection [CS56].	Ensure operation is undertaken outdoors [E69].

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Drum and small package filling [CS6]. Dedicated facility [CS81]	Use drum pumps or carefully pour from container [E64]. Avoid carrying out activities involving exposure for more than 1 hour [OC27], or: Wear a respirator conforming to EN140 with Type A filter or better. [PPE22]
(closed systems) [CS107] use a fuel	No specific measures identified [E18].
Equipment cleaning and maintenance [CS39]. Non-dedicated facility [CS82] e.g fuel pump repair indoor	Drain down system prior to equipment break-in or maintenance [E65]. Avoid carrying out activities involving exposure for more than 4 hours [OC28], or: Wear a respirator conforming to EN140 with Type A filter or better. [PPE22]
Equipment cleaning and maintenance [CS39]. Non-dedicated facility [CS82] e.g fuel pump repair outdoor	Drain down system prior to equipment break-in or maintenance [E65]. Avoid carrying out activities involving exposure for more than 4 hours [OC28], or: Wear a respirator conforming to EN140 with Type A filter or better. [PPE22]
Storage [CS67]; General exposures (closed systems) [CS15].	No specific measures identified [E18].
Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is a unique structure [PrC1]. Predominantly hydrophobic [PrC4a]. Readily biodegradable [PrC5a].	
Operational condition	
Outdoor use [OOC1].	
Amount used	
Average daily use over a year for wide dispersive use (kg/d):	3.61
Frequency and duration of use	
Dispersive use [FD3].	
Emission days (days/year)	365
Other given operational conditions affecting environmental exposure	
Use in open systems.	
Release fraction to air from wide dispersive use (regional only):	1.00E-02
Release fraction to wastewater from wide dispersive use:	1.00E-05
Release fraction to surface water from wide dispersive use (regional only):	1.00E-04
Release fraction to soil from wide dispersive use (regional only):	1.00E-05
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used [TCS 1].	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Air:	No air emission controls required; required removal efficiency is 0% [TCR5].
Wastewater:	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of >95% [TCR9].
Soil:	No soil emission controls required; required removal efficiency is 0% [TCR7].
Organisation measures to prevent/limit release from site	
Prevent discharge of undissolved substance to or recover from wastewater [OMS1].	
Conditions and measures related to municipal sewage treatment plant	
Assumed industrial sewage treatment plant effluent flow is 2000 m3/d.	
Conditions and measures related to external treatment of waste for disposal	
Not applicable	
Conditions and measures related to external recovery of waste	
Not applicable	
Other environmental control measures additional to above	
None	

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3 Use as a fuel – Consumer

Section 1 Exposure Scenario	
Title	
Use as a fuel	
Use Descriptor	
Sector(s) of Use	Consumer (SU21)
Product Categories	13
Environmental Release Categories	8d
Specific Environmental Release Category	ESVOC30 SpERC
Processes, tasks, activities covered	
Use of fuel for refuelling 2-stroke and 4-stroke engines	
Section 2 Operational conditions and risk management measures	
Section 2.1 Control of worker exposure	
Product characteristics	
Physical form of product	Liquid, vapour pressure > 10 kPa [OC5].
Vapour pressure	330 hPa at 25 °C
Concentration of substance in product	Covers percentage substance in the product up to 15% [Gnew].
Amount used	Up to 60 litres per refuelling
Frequency and duration of use/exposure	Up to 3 times a week
Other Operational Conditions Affecting Exposure	Unless otherwise stated assumes use at ambient temperatures [ConsOC15]
Contributing Scenarios	Specific Risk Management Measures and Operating Conditions
PC13: Fuel	OC Unless otherwise stated, covers concentrations up to 15% [ConsOC1]; covers use up to 150 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers exposure up to 15 min/event[ConsOC14];
	RMM No specific RMMs identified beyond those OCs stated
Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is a unique structure [PrC1]. Predominantly hydrophobic [PrC4a]. Readily biodegradable [PrC5a].	
Operational condition	
Outdoor use [OOC1].	
Amount used	
Average daily use over a year for wide dispersive use (kg/d):	3.61
Frequency and duration of use	
Dispersive use [FD3].	
Emission days (days/year)	365
Other given operational conditions affecting environmental exposure	
Use in open systems.	
Release fraction to air from wide dispersive use (regional only):	1.00E-02
Release fraction to wastewater from wide dispersive use:	1.00E-05
Release fraction to surface water from wide dispersive use (regional only):	1.00E-04
Release fraction to soil from wide dispersive use (regional only):	1.00E-05
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used [TCS 1].	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Air:	No air emission controls required; required removal efficiency is 0% [TCR5].

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Wastewater:	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of >95% [TCR9].
Soil:	No soil emission controls required; required removal efficiency is 0% [TCR7].
Organisation measures to prevent/limit release from site	
Prevent discharge of undissolved substance to or recover from wastewater [OMS1].	
Conditions and measures related to municipal sewage treatment plant	
Assumed industrial sewage treatment plant effluent flow is 2000 m3/d.	
Conditions and measures related to external treatment of waste for disposal	
Not applicable	
Conditions and measures related to external recovery of waste	
Not applicable	
Other environmental control measures additional to above	
None	

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TAME

1 Use as a fuel – Industrial Sector

Section 1 Exposure Scenario	
Title	
Use as a fuel	
Use Descriptor	
Sector(s) of Use	Industrial (SU3)
Process Categories	1, 2, 3, 8a, 8b, 16
Environmental Release Categories	8b
Specific Environmental Release Category	ESVOC3 SpERC
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.	
Section 2 Operational conditions and risk management measures	
Section 2.1 Control of worker exposure	
Product characteristics	
Physical form of product	Liquid, vapour pressure 0.5 - 10 kPa [OC4].
Concentration of substance in product	Covers percentage substance in the product up to 15% [Gnew].
Amount used	Not applicable
Frequency and duration of use/exposure	Covers daily exposures up to 8 hours (unless stated differently) [G2]
Human factors not influenced by risk management	Not applicable
Other Operational Conditions Affecting Exposure	Assumes a good basic standard of occupational hygiene is implemented [G1].
Contributing Scenarios	Specific Risk Management Measures and Operating Conditions
Bulk transfers [CS14]. ; Batch process [CS55]. With sample collection [CS56]. ; Filling / preparation of equipment from drums or containers. [CS45].	Ensure material transfers are under containment or extract ventilation [E66]. Use vapour recovery units when necessary [A7]. {Clear transfer lines prior to de-coupling [E39]}. ; {Transfer via enclosed lines [E52]}.
Drum/batch transfers [CS8]. ; Filling / preparation of equipment from drums or containers. [CS45]. Bulk transfers [CS14]. ; Dedicated facility [CS81]	Use drum pumps [E53].-{Avoid spillage when withdrawing pump [C&H16]}.
General exposures (closed systems) [CS15].	No specific measures identified [E18].
General exposures (closed systems) [CS15]. ; Equipment cleaning and maintenance [CS39]. ; With sample collection [CS56].	No specific measures identified [E18].
General exposures (closed systems) [CS15]. ; Use in contained batch processes [CS37]. ; With sample collection [CS56].	No specific measures identified [E18].

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General exposures (open systems) [CS16]. ; (closed systems) [CS107]refuelling [CS507]	No specific measures identified [E18].
General exposures (open systems) [CS16]. ; (closed systems) [CS107]Batch process [CS55].	No specific measures identified [E18].
Equipment cleaning and maintenance [CS39]. Non-dedicated facility [CS82]e.g fuel pump repair indoor	Provide enhanced mechanical ventilation by mechanical means [E48].or: Wear a respirator conforming to EN140 with Type A filter or better. [PPE22]{Allow time for product to drain from workpiece [E121]}. {Wear suitable coveralls to prevent exposure to the skin [PPE27]}.
Vessel and container cleaning [CS103]Non-dedicated facility [CS82]	Ensure material transfers are under containment or extract ventilation [E66]. Apply vessel entry procedures including use of forced supplied air [AP15]. Retain drain downs in sealed storage pending disposal or for subsequent recycle [ENVT4]. {Wear suitable coveralls to prevent exposure to the skin [PPE27]}.
Storage [CS67]; General exposures (closed systems) [CS15].	No specific measures identified [E18].
Storage [CS67]; General exposures (closed systems) [CS15]. ; With sample collection [CS56].	{Ensure samples are obtained under containment or extract ventilation [E76]}
Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is a unique structure [PrC1]. Predominantly hydrophobic [PrC4a]. Readily biodegradable [PrC5a].	
Operational condition	
Outdoor use [OOC1].	
Amount used	
Fraction of EU tonnage used in region [A1]:	0.37
Regional use tonnage (tonnes/year) [A2]:	125,000
Fraction of regional tonnage used locally [A3]:	0.02
Average local daily tonnage (kg/d) [A5]:	7,143
Annual site tonnage (tonnes/year) [A6]	2,500
Frequency and duration of use	
Continuous release [FD2].	
Emission days (days/year)	350
Other given operational conditions affecting environmental exposure	
Use in closed systems. Either wet or dry processes.	
Release fraction to air from process:	1.00E-04
Release fraction to wastewater from process:	1.00E-05
Release fraction to soil from process (regional only):	1.00E-05
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used [TCS 1].	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Air:	No air emission controls required; required removal efficiency is 0% [TCR5].
Wastewater:	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of >95% [TCR9].
Soil:	No soil emission controls required; required removal efficiency is 0% [TCR7].
Organisation measures to prevent/limit release from site	
Prevent discharge of undissolved substance to or recover from wastewater [OMS1].	
Conditions and measures related to municipal sewage treatment plant	
Assumed industrial sewage treatment plant effluent flow is 2000 m3/d.	
Conditions and measures related to external treatment of waste for disposal	
Not applicable	

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Conditions and measures related to external recovery of waste
Not applicable
Other environmental control measures additional to above
None

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2 Use as a fuel – Professional Sector

Section 1 Exposure Scenario	
Title	
Use as a fuel	
Use Descriptor	
Sector(s) of Use	Professional (SU22)
Process Categories	1, 2, 3, 8a, 8b, 9, 16
Environmental Release Categories	8b, 8e
Specific Environmental Release Category	ESVOC30 SpERC
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.	
Section 2 Operational conditions and risk management measures	
Section 2.1 Control of worker exposure	
Product characteristics	
Physical form of product	Liquid, vapour pressure 0.5 - 10 kPa [OC4].
Concentration of substance in product	Covers percentage substance in the product up to 15% [Gnew].
Amount used	Not applicable
Frequency and duration of use/exposure	Covers daily exposures up to 8 hours (unless stated differently) [G2]
Human factors not influenced by risk management	Not applicable
Other Operational Conditions Affecting Exposure	Assumes a good basic standard of occupational hygiene is implemented [G1].
Contributing Scenarios	Specific Risk Management Measures and Operating Conditions
Bulk transfers [CS14]. ; Batch process [CS55]. With sample collection [CS56]. ; Filling / preparation of equipment from drums or containers. [CS45].	Ensure material transfers are under containment or extract ventilation [E66]. {Clear transfer lines prior to de-coupling [E39]}. ; {Transfer via enclosed lines [E52]}. {Ensure operation is undertaken outdoors [E69]}.
Drum/batch transfers [CS8]. ; Filling / preparation of equipment from drums or containers. [CS45]. Bulk transfers [CS14]. ; Dedicated facility [CS81]	Ensure material transfers are under containment or extract ventilation [E66]. {Use drum pumps [E53]}. {Avoid spillage when withdrawing pump [C&H16]}.
Dipping, immersion and pouring [CS4]. refuelling [CS507]	Avoid carrying out activities involving exposure for more than 4 hours [OC28]or: Ensure material transfers are under containment or extract ventilation [E66]. {Avoid spillage when withdrawing pump [C&H16]}.
General exposures (closed systems) [CS15]. ; Equipment cleaning and maintenance [CS39]. ; With sample collection [CS56].	No specific measures identified [EI18].
General exposures (closed systems) [CS15]. ; Use in contained batch processes [CS37]. ; With sample collection [CS56].	No specific measures identified [EI18].

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Drum and small package filling [CS6]. Dedicated facility [CS81]	Fill containers/cans at dedicated fill points supplied with local extract ventilation [E51] or: Wear a respirator conforming to EN140 with Type A filter or better. [PPE22]{Ensure material transfers are under containment or extract ventilation [E66]}.
General exposures (open systems) [CS16]. ; (closed systems) [CS107]; Refueling [CS507].	No specific measures identified [E118].
Equipment cleaning and maintenance [CS39]. Non-dedicated facility [CS82] e.g fuel pump repair indoor	Drain down system prior to equipment break-in or maintenance [E65].{Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings (professional use) [E60]}.
Equipment cleaning and maintenance [CS39]. Non-dedicated facility [CS82] e.g fuel pump repair outdoor	Drain down system prior to equipment break-in or maintenance [E65].{Ensure operation is undertaken outdoors [E69]}.
Storage [CS67]; General exposures (closed systems) [CS15].	No specific measures identified [E118].
Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is a unique structure [PrC1]. Predominantly hydrophobic [PrC4a]. Readily biodegradable [PrC5a].	
Operational condition	
Outdoor use [OOC1].	
Amount used	
Average daily use over a year for wide dispersive use (kg/d):	0.68
Frequency and duration of use	
Dispersive use [FD3].	
Emission days (days/year)	365
Other given operational conditions affecting environmental exposure	
Use in open systems.	
Release fraction to air from wide dispersive use (regional only):	1.00E-02
Release fraction to wastewater from wide dispersive use:	1.00E-05
Release fraction to surface water from wide dispersive use (regional only):	1.00E-04
Release fraction to soil from wide dispersive use (regional only):	1.00E-05
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used [TCS 1].	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Air:	No air emission controls required; required removal efficiency is 0% [TCR5].
Wastewater:	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of >95% [TCR9].
Soil:	No soil emission controls required; required removal efficiency is 0% [TCR7].
Organisation measures to prevent/limit release from site	
Prevent discharge of undissolved substance to or recover from wastewater [OMS1].	
Conditions and measures related to municipal sewage treatment plant	
Assumed industrial sewage treatment plant effluent flow is 2000 m3/d.	
Conditions and measures related to external treatment of waste for disposal	
Not applicable	
Conditions and measures related to external recovery of waste	
Not applicable	
Other environmental control measures additional to above	
None	

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3 Use as a fuel – Consumer

Section 1 Exposure Scenario		
Title		
Use as a fuel		
Use Descriptor		
Sector(s) of Use	Consumer (SU21)	
Product Categories	13	
Environmental Release Categories	8d	
Specific Environmental Release Category	ESVOC30 SpERC	
Processes, tasks, activities covered		
Use of fuel for refuelling 2-stroke and 4-stroke engines		
Section 2 Operational conditions and risk management measures		
Section 2.1 Control of worker exposure		
Product characteristics		
Physical form of product	Liquid, vapour pressure 0.5 - 10 kPa [OC4].	
Vapour pressure	91 hPa at 25 °C	
Concentration of substance in product	Covers percentage substance in the product up to 15% [Gnew].	
Amount used	Up to 60 litres per refuelling	
Frequency and duration of use/exposure	Up to 3 times a week	
Other Operational Conditions Affecting Exposure	Unless otherwise stated assumes use at ambient temperatures [ConsOC15]	
Contributing Scenarios		Specific Risk Management Measures and Operating Conditions
PC13: Fuel	OC	Unless otherwise stated, covers concentrations up to 15% [ConsOC1]; covers use up to 150 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers exposure up to 15 min/event[ConsOC14];
	RMM	No specific RMMs identified beyond those OCs stated
Section 2.2 Control of environmental exposure		
Product characteristics		
Substance is a unique structure [PrC1]. Predominantly hydrophobic [PrC4a]. Readily biodegradable [PrC5a].		
Operational condition		
Indoor/Outdoor use [OOC3].		
Amount used		
Average daily use over a year for wide dispersive use (kg/d):	0.68	
Frequency and duration of use		
Dispersive use [FD3].		
Emission days (days/year)	365	
Other given operational conditions affecting environmental exposure		
Use in open systems.		
Release fraction to air from wide dispersive use (regional only):	1.00E-02	
Release fraction to wastewater from wide dispersive use:	1.00E-05	
Release fraction to surface water from wide dispersive use (regional only):	1.00E-04	
Release fraction to soil from wide dispersive use (regional only):	1.00E-05	
Technical conditions and measures at process level (source) to prevent release		
Common practices vary across sites thus conservative process release estimates used [TCS 1].		
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil		

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Air:	No air emission controls required; required removal efficiency is 0% [TCR5].
Wastewater:	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of >95% [TCR9].
Soil:	No soil emission controls required; required removal efficiency is 0% [TCR7].
Organisation measures to prevent/limit release from site	
Prevent discharge of undissolved substance to or recover from wastewater [OMS1].	
Conditions and measures related to municipal sewage treatment plant	
Assumed industrial sewage treatment plant effluent flow is 2000 m3/d.	
Conditions and measures related to external treatment of waste for disposal	
Not applicable	
Conditions and measures related to external recovery of waste	
Not applicable	
Other environmental control measures additional to above	
None	

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ETHANOL

1 Formulation & (re)packing of substances and mixtures – Industrial Sector

Section 1 Exposure Scenario		
Title		
Formulation & (re)packing of substances and mixtures		
Ethanol REACH Association reference no. ES3		
Use Descriptor		
Sector(s) of Use	3, 10	
Process Categories	3, 5, 8a, 8b, 9, 14	
Environmental Release Categories	2	
Processes, tasks, activities covered		
Covers industrial formulation, packing and re-packing of the substance and its mixtures in batch or continuous operations, including storage, materials transfers, mixing, large and small scale packing, maintenance. Includes formulation of fuels containing ethanol.		
Metodologia di valutazione	Ecetoc TRA integrated model version 2, EUSES v.2.	
Section 2 Operational conditions and risk management measures		
Process category: Manufacture or formulation of chemical products or articles using technologies related to mixing and blending of solid or liquid materials, and where the process is in stages and provides the opportunity for significant contact at any stage. Filling lines specifically designed to both capture vapour and aerosol emissions and minimise spillage. Sampling, loading, filling, transfer, dumping, bagging in nondedicated and dedicated facilities with possible exposure related to dust, vapour, aerosols or spillage, and cleaning of equipment. Environmental release category: Manufacture of organic and inorganic substances in chemical, petrochemical, primary metals and minerals industry including intermediates, monomers using continuous processes or batch processes applying dedicated or multi-purpose equipment, either technically controlled or operated by manual interventions		
Number of sites using the substance: Substance widely used.		
Sezione 2.1 Control of worker exposure		
Product characteristic (including package design affecting exposure)	Physical state	Liquid
	Concentration of substance in product	Up to 100%
	Vapour pressure of substance	5.73 kPa
Amounts used	n.a. in tier1 TRA model	
Frequency and duration of use/exposure	Frequency of exposure (weekly)	> 4 Days/week
	Frequency of exposure (annual)	240 Days/year
	Duration of exposure	> 4 Hours/day
Human factors not influenced by risk management	Potentially exposed body parts	Two hands face side only (automated processes/PROC3) Two hands (transfer, filling, etc./PROC8a,b)
	Exposed skin surface	480 cm ² (automated processes/PROC3) 960 cm ² (transfer, filling, etc./PROC8a,b)
Other given operational conditions affecting workers exposure	Assumes a good basic standard of occupational hygiene is implemented.	
	Setting (indoor/outdoor)	Indoors
Technical conditions and measures at process level (source) to prevent release	No specific measures identified.	
Technical conditions and measures to control dispersion from source towards the worker	Ensure material transfers are under containment or extract ventilation. Provide good ventilation to points where emissions occur. Provide a good standard of general or controlled ventilation (5 to 15 air changes per hour).	

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Organisational measures to prevent /limit releases, dispersion and exposure	No specific measures identified.		
Conditions and measures related to personal protection, hygiene and health evaluation	PPE: Eye Protection – suitable eye protection should be worn when handling product if there is a risk of splashing. Wear suitable gloves tested to EN374 during the activities where excessive skin contact is possible.		
Sezione 2.2 Control of environmental exposure			
Product characteristics	Physical state	Liquid	
	Concentration of substance in product	Up to 100%	
Amounts used	Daily at point source	n.a.	
	Annually at point source	280,000 t/year (maximum at point source in worst case)	
	Annually total	3,800,000 t/year	
Frequency and duration of use	Pattern of release	Continuous 300 days per year	
Environment factors not influenced by risk management	Flow rate of receiving surface water	18,000m ³ /day (default)	
Other given operational conditions affecting environmental exposure	Processing setting (indoor/outdoor)	Indoor	
	Processing temperature	Ambient	
	Processing pressure	Ambient	
Technical conditions and measures at process level (source) to prevent release	Keep containers tightly closed. Store in a bounded area. Do not discharge into sewers or drains. Waste product and empty containers should be disposed of as hazardous waste in accordance with all local and national regulations. Formulation activity is assumed to be a predominantly enclosed process.		
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Apply technical measures aiming at reduction and cleaning of waste water (WWTP/local STP (e.g. biological treatment))	Efficacy > 90%	
Organizational measures to prevent/limit release from site	Do not release wastewater directly into environment	Wastewater release into municipal STP.	
Conditions and measures related to municipal sewage treatment plant	Size of STP	> 2,000 m ³ /day	
	Degradation efficacy	90% (for ethanol)	
	Sludge treatment	Disposal or recovery	
Conditions and measures related to treatment of waste	Hazardous waste incineration or dispose for use in recycled fuels		
Exposure estimation			
Workers exposure estimation is calculated with Ecetoc TRA model v2.. Below given exposure estimates are based on the PROC with the highest exposure levels in this scenario (PROC8a).			
Workers exposure	Exposure estimate	DNEL	Comment
Inhalation (mg/m ³)	96.04	950	PROC 8a results in the highest exposure in this exposure scenario
Dermal (mg/Kg/day)	13.71	343	
Combined (mg/Kg/day)	27.43	343	
Environmental exposure estimation is based on Ecetoc TRA model v2 including the data from TGD A&B tables (MC-1b, IC-9, UC-27, fraction main source 0,1) and based on the worst-case scenario. Ethanol is fully soluble in water, readily biodegradable, not bio-accumulative, does not accumulate in the sediments or soil and is assumed to degrade by 90% in the local and/or municipal STP under evaluated conditions.			
Release times per year (day/year)	300	Local release to air (kg/day)	469
Fraction used at main local source	0.1	Local release to waste water (kg/day)	28

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Amount used locally (kg/day)	93.333	Local release to soil (kg/day)	9
Environmental exposure	PEC	PNEC	Comment
In STP / untreated wastewater(mg/l)	1.73	580	-
In local freshwater (mg/l)	0.185	0.96	-
In local soil	0.0117 (mg/kg)	0.63 (mg/ kgwwt)	-
In local marine water (mg/l)	0.0186	0.79	-
Total daily intake via local environment (mg/kgdw/d)	Negligible compared to daily dietary intake and endogenous formation.		
Guidance to DU to evaluate whether he works inside the boundaries set by the ES			
<p>The workers exposure and environmental emissions have been evaluated using Ecetoc TRA integrated tool version 2. If the local environmental emission conditions deviate significantly from the used default values, please use the algorithm below to estimate the correct local emissions and RCRs: $PEC_{corrected} = PEC_{calculated} * (\text{local emission fraction}) * (\text{local WWTP flow rate fraction}) * (\text{local river flow rate fraction}) * (\text{local STP efficiency fraction})$ <u>Example for calculating your local freshwater PEC:</u> $Corrected \text{ local freshwater PEC} = 0.185 * (\text{your local emission [kg/day]} / 28) * (2,000 / \text{your local WWTP flow rate [m}^3\text{/day]}) * (18,000 / \text{your local river flow rate [m}^3\text{/day]}) * ((1 - \text{your local WWTP efficiency})/0.1)$</p>			
Additional good practice advice beyond the REACH CSA	Use specific measures expected to reduce the predicted exposure beyond the level estimated based on the exposure scenario when possible.		
<p>Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37 (4) of REACH</p>			