



## SAFETY DATA SHEET- Extended

Prepared in accordance with Annex II of REACH Regulation (EC) 1907/2006, Regulation (EC) 1272/2008 and regulation (EC) 453/2010

### 2-ETHYLHEXANOL (OCTANOL)

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## 1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

### 1.1. Substance Identification

Trade name	<b>2-Ethylhexanol (Octanol)</b>
IUPAC name	2-ethylhexan-1-ol
Synonym	2-Ethylhexanol, Ethylhexyl Alcohol
EC#	203-234-3
CAS #	104-76-7
Molecular Formula	C <sub>8</sub> H <sub>18</sub> O
Molecular weight	130.2279
REACH Registration number	01-2119487289-20-0009
Chemical characterization	Organic Mono-constituent substance

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

Main use of 2-ethyl hexanol is that of an intermediate under strictly controlled conditions. Apart from this it is used in various products and processes as functional fluid, process chemical, cleaning agent and other purposes. The detailed uses can be discerned from the list of exposure scenarios below.

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**Table 1. Description of identified uses**

ES no.	ES short title	Identified uses			SU <sup>1</sup>	PC	PROC	AC	ERC
		Formulation	End use	Consumer use					
ES 1	Manufacture				3 (8, 9)	NA	1, 2, 3, 4, 8a,b, 15	NA	1, 4 *
ES 2	Distribution				3 (10)	NA	1, 2, 3, 4, 8a,b, 9, 15	NA	1, 2 *
ES 3	Formulation	X			3 (10)	NA	1, 2, 3, 4, 5, 8a,b, 9, 14, 15	NA	2 *
ES 4	Use in coatings (ind.)		X		3	5, 9a,b	1, 2, 3, 4, 5, 7, 8a,b, 9, 10, 13, 14, 15	NA	4 *
ES 5	Use in coatings (prof.)		X		22	5, 9a,b	1, 2, 3, 4, 5, 8a,8b, 10, 11, 13, 15, 19	NA	8a,d *
ES 6	Dilution of a concentrate (prof.)		X		22	NA <sup>2</sup>	5, 8a,b	NA	8d <sup>#</sup>
ES 7	Dilution of a concentrate (cons.)			X	21	NA <sup>2</sup>	NA	NA	8d <sup>#</sup>
ES 8	Use in laboratories		X		3	NA	10, 15	NA	2, 4 *
ES 9	Use in functional fluids (ind.)		X		3	4, 17, 24	1, 2, 3, 4, 8a,b, 9, 20	NA	7 *
ES 10	Use in functional fluids (prof.)		X		22	4, 17, 24	1, 2, 3, 8a, 9, 20	NA	9a,b *
ES 11	Use in cleaning products		X		22	35	2, 3, 4, 8a, 8b, 10, 11, 13	NA	8a,d *
ES 12	Use in oil and gas field drilling		X		3 (2b)	20	1, 2, 3, 4, 8a,b	NA	4 *

<sup>1</sup> SU: Sector of use; PC: Product category; PROC: Process category; AC: Article category; ERC: Environmental Release Category

<sup>2</sup> Different products categories are covered by this scenario but exposure is determined by the dilution event and not by the type of product

\* specific ERCs (spERCs) were used in the exposure estimation; see the following chapters

<sup>#</sup> also covers ERC 8a



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**Uses advised against:** No uses advised against.

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

Name	S.C. OLTCHIM S.A
Address	1 Uzinei Street, 240050 Ramnicu Valcea, Romania
Phone N°	+40 250 701 200
FAX N°	+40 250 735 030
E-mail of competent person responsible for SDS in the MS or in the EU:	tehnich@oltchim.ro

### 1.4. Emergency telephone

European Emergency N°:	112
Emergency telephone at the company:	+40/250/738141
Available outside office hours:	24h/day/365days

## 2. HAZARD IDENTIFICATION

### 2.1. Classification of the substance

#### 2.1.1. Classification according to Regulation (EC) 1272/2008 (CLP/GHS)

Acute Tox. 4: H332: Harmful if inhaled.

Skin Irrit. 2: H315: Causes skin irritation.

Eye Irrit. 2A: H319: Causes serious eye irritation.

STOT Single Exp. 3: H335: May cause respiratory irritation.

Affected organs: Respiratory tract; Route of exposure: Inhalation

#### 2.1.2. Classification according to Directive 67/548/EEC

Xn; R20 Harmful

Xi; R36/37/38 Irritant



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## 2.2. Label elements

### 2.2.1. Labeling according to Regulation (EC) 1272/2008 (CLP/GHS)

Signal word: Warning

Hazard pictogram:



GHS07: exclamation mark

#### Hazard statements:

H335: May cause respiratory irritation.

H315: Causes skin irritation.

H319: Causes serious eye irritation.

H332: Harmful if inhaled.

#### Precautionary statements:

P233: Keep container tightly closed.

P261: Avoid breathing dust/fume/gas/mist/vapours/spray.

P280: Wear protective gloves/protective clothing/eye protection/face protection.

P302+P352: IF ON SKIN: Wash with plenty of soap and water.

P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P312: Call a POISON CENTER or doctor/physician if you feel unwell.

P362: Take off contaminated clothing and wash before reuse.



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#### 2.2.2. Labeling according to Directive 67/548/EEC

Indication of danger: Xn – harmful



#### R-phrases:

R20 – Harmful by inhalation

R36/37/38 - Irritating to eyes, respiratory system and skin

#### S-phrases:

S26 - in case of contact with eyes, rinse immediately with plenty of water and seek medical advice

S37 - Wear suitable gloves.

#### 2.3. Other effects

The substance does not fulfil the PBT criteria (not PBT) and not the vPvB criteria (not vPvB).

2-Ethylhexanol is a combustible and flammable liquid. In contact with strong oxidizers may cause fire.

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical name	PBT/ vPvB	CAS no/EC No/REACH No.	Classification according to Reg (EC) No. 1272/2008)	Classification according to D 67/548/EC	Concentra tion (%)
2-Ethylhexanol	No/No	104-76-7/203-234- 3/01-2119487289- 20-0009	Acute Tox. 4: H332 Skin Irrit. 2: H315 Eye Irrit. 2A: H319 STOT Single Exp. 3: H335	Xn; R20 Xi; R36/37/38	Min.99.5

#### Impurities

No impurities relevant for classification and labeling.

See section 16 for the full text of the R phrases and H-statement declared above



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## 4. FIRST - AID MEASURES

### 4.1 Description of first aid measures

**General Advice:** IF exposed or if you feel unwell: Call a Poison Center or doctor/physician. Show this safety data sheet to the doctor in attendance.

**If inhaled:** Remove to fresh air and rest in half upright position. If not breathing, give artificial respiration. If breathing is difficult give oxygen. Keep person warm and at rest. Call a physician.

**In case of skin contact:** Wash the contaminated skin with plenty of soap or mild detergent and water for at least 15 minutes while removing contaminated clothing and shoes. If irritation persists after washing, get medical attention.

**In case of eye contact:** Wash the eyes immediately with large amount of water lifting the upper and lower lids, until no evidence of chemical remains at least 15-20 minutes. If irritation persists after washing get medical attention. Contact lenses should not worn with this product.

**In case of ingestion:** Give large amount of water to drink. If large amounts were swallowed, get medical advise. Never give anything by mouth to an unconscious person.

**Administration of gastric lavage is permitted only by qualified medic personnel.**

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

By inhalation: Inhalation of vapor or mist is irritating to the upper respiratory tract. May have narcotic effect. Difficult breathing, coughing, headache, dizziness and drowsiness may occur. May be absorbed into the bloodstream with symptoms similar to ingestion.

By skin contact: Causes skin irritation. May be absorbed through skin.

By eye contact: Causes irritation, redness and pain.

By ingestion: May have narcotic effect. May cause abdominal pain, nausea, headache, dizziness and diarrhea. Large doses may affect kidneys and liver.

Chronic effects: Persons with pre-existing skin disorders or eye problems or impaired liver, kidney or respirator function may be more susceptible to the effects of the substance.

### 4.3 Indication of immediate medical attention and special treatment needed

Treat symptomatically and supportively.



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## 5. FIRE - FIGHTING MEASURES

### 5.1 Extinguishing media

**Suitable extinguishing media:** Dry chemical, foam or carbon dioxide and water spray.

**Unsuitable extinguishing media:** Do not use a solid stream of water (water jet), since the stream will scatter and spread the fire. Use water spray to isolate the hazard area and to keep fire-exposed tanks cool.

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

**Exposure hazards:** 2-Ethylhexanol is a combustible and flammable liquid. In contact with strong oxidizers may cause fire. Vapor/air mixtures are explosive above 75<sup>0</sup>C. Vapor may flow along surface to distant ignition sources and flash back. Carbon monoxide and dioxide may form when heated to decomposition. In case of large fire and remove the containers if this it is possible.

**Hazardous combustion products:** Carbon monoxide and carbon dioxide.

### 5.3 Advice for firefighters

**Protection of fire-fighters:** Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. Clothing for firefighters (including helmets, protective boots and gloves) conforming to European standard EN 469 will provide a basic level of protection for chemical incidents.

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## 6.1. Personal precautions, protective equipment and emergency procedures

**For non-emergency personnel:** Keep unnecessary and unprotected personnel away from entering. Avoid contact with skin, eyes, and clothing – wear suitable protective equipment (see section 8). Do not touch or walk through spill material. Shut off all ignition sources.

**For emergency responders:** Ventilate area of leak or spill. Remove all sources of ignition. Persons performing clean-up work should wear adequate personal protective equipment and a self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.



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**Environmental precautions:** Prevent from contamination the ground and the surface water by isolating the hazard area. Contain and recover liquid when possible. Keep closed containers and dispose according to all applicable federal, state or local environment regulations

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

**Methods of cleaning up:** Absorb spills with dry sand, earth or similar non-combustible absorbent material then collect into drums for later disposal. For large spills, dike and pump into suitable containers for disposal. Use water spray to reduce vapors and flush area with water. Resulted waste water will be treated in biological treatment plant. Dispose of under valid legal waste regulations.

**Special precautions:** Do not use combustible materials, such as saw dust to absorb the spills. Do not flush to sewer! Use only non sparking tools and equipment.

### 6.4 Reference to other sections

Additional advice: Refer to section 8, 13.

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## 7. HANDLING AND STORAGE

### 7.1. Precautions for safe handling

**Protective measures:** Protect containers from physical damage. Use non sparking tools, electric equipment and venting system. Sources of ignition such as smoking and open flames are prohibited when 2-ethylhexanol is handled. Bonding and grounding are important to prevent the accumulation of static electricity and provide for its safe discharge. Bonding and grounding are required for all equipment. Do not use compressed air or oxygen for filling, discharging or handling. The personnel which handling the product must wear protective equipment.

**Advice on general occupational hygiene:** Avoid inhalation or ingestion and contact with skin and eyes. General occupational hygiene measures are required to ensure safe handling of the substance. These measures involve good personal and housekeeping practices (i.e. regular cleaning with suitable cleaning devices), no drinking, eating and smoking at the workplace. Shower and change clothes at end of work shift. Do not wear contaminated clothing at home.

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

**Storage:** Store in a tightly closed containers in a cool, dry, well ventilated area away from sources of heat and incompatible substances. Drums must be equipped with self-closing valves, nitrogen



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blanket. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid).

Incompatible materials: Strong oxidizers and acids.

Incompatible materials for storage: Tanks constructed from normal steel are reliable for storing 2-ethylhexanol. If severe demands are imposed on the quality of the product, the tanks should be constructed of stainless steel.

### 7.3. Specific end use(s)

Please check the identified uses from Section 1.2.

For more information please see the relevant exposure scenario, available via your supplier/given in the Annex I.

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## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

### 8.1 Control parameters

PNEC aqua (freshwater): 0.017 mg/L

PNEC aqua (marine water): 0.0017 mg/L

PNEC aqua (intermittent releases): 0.17 mg/L

PNEC sediment (freshwater): 0.28 mg/kg sediment dw

PNEC sediment (marine water): 0.028 mg/kg sediment dw

PNEC STP: 10 mg/L mg/L

PNEC soil: 0.047 mg/kg soil dw

### 8.2 Exposure controls

**Engineering control** : A system of local and/or general exhaust is recommended to keep employee exposure as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its sources, preventing dispersions of it into the general work area. Ventilation equipment should be explosion- proof if explosive concentration of dust, vapor or fume are present.

**Respiratory protection**: For conditions of use where exposure to substance is apparent , consult an industrial hygienist. For emergencies or instances where the exposure level are not known, use a full face piece positive pressure air-supplied respirator.

**Hand protection** : Wear rubber ( nitrile) gloves.

**Eye / Face protection** : Use chemical safety goggles and/or a full face shield when is possible



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**Skin protection :** Wear impervious protective clothing, including boots, gloves, lab coat apron or coveralls as appropriate, to prevent skin contact.

**Other precautions:** Maintain shower, eye wash fountain and quick-drench facilities in work area.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### General informations

Appearance	Clear liquid
Odor	Characteristic

### Important health, safety and environmental informations

pH value at 1g/l water	7
Boiling point	184 °C at 1013 hPa
Flash point	77 °C at 1013 hPa
Flammability	The flammability of a liquid is described by flash point and boiling point.
Explosive properties	The substance does not contain any groups associated with explosivity
Oxidizing properties	no oxidizing properties
Vapor pressure	<1 hPa at 20°C
Specific gravity (water=1) at 20° C	0,833
Solubility –water	0.9 g/L at 20°C and pH 5.8
-organic solvents	miscible with most common solvents
Partition coefficient (log $K_{ow}$ )	2.9 at 25°C
Dynamic viscosity at 20° C	
Vapor relative density (air=1)	4,5
Evaporation rate (BuAc=1)	0.01
Viscosity, dinamic	9.845 mPa s (dynamic) at 20 °C

### Other informations

Melting point	-89° C
Auto flammability	280 ° C at 1017 hPa

## 10 . STABILITY AND REACTIVITY



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**10.1. Reactivity:** See section 10.5.

**10.2. Chemical stability:** Stable under ordinary conditions of use and storage.

**10.3. Possibility of hazardous reactions:**

Hazardous reaction with strong oxidizers.

**10.4. Conditions to avoid:** Heat, sparks, electric equipment & open flame.

**10.5. Incompatible materials:** Strong oxidizers, acids, alkalies.

## 11. TOXICOLOGICAL INFORMATION

	Conclusions
<b>Absorbtion</b>	no bioaccumulation potential based on study results.
<b>Acute toxicity</b>	<u>Oral route:</u> Rat: LD50 = 2047 mg/kg bw (males); GLP, OECD 401 or similar <u>Dermal route:</u> Rabbit, LD50: > 2600 mg/kg bw <u>Inhalation route:</u> Rat: LC50 (4 h): ≥1400 mg/m <sup>3</sup> air (OECD 403) Overall, the acute oral, inhalation, and dermal toxicity of 2-EH is low and does only require classification with regard to inhalative toxicity (aerosol formation conditions) (acute category 4).
<b>Irritation/Corrosion</b>	<u>Skin</u> Results of the available studies led to the classification as skin irritant Xi,R38) according to Annex I of 67/548/EEC, corresponding to skin irritation Cat. 2 following 1272/2008/EC (CLP) requirements. <u>Eye</u> Due to the irreversible irritation effects on rabbit eyes, 2-ethylhexanol has to be classified as Xi, R36 according to Annex I of 67/548/EEC and as eye irritant Cat. 2A according to 1272/2008/EC (CLP) criteria. <u>Respiratory tract</u>



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	<p>2 -EH may cause respiratory irritation at concentrations of 50 ppm or higher. Signs of respiratory irritation of unclear adversity were observed in human experimental studies at 20 ppm (<b>Kiesswetter et al., 2005; van Thriel et al., 2005</b>). Based on the available data on respiratory irritation in humans the test substance has to be classified into specific target organ toxicity category 3 (STOT 3, H335) according to Regulation (EC) No 1272/2008.</p>
<b>Sensitisation</b>	<p>2-ethylhexanol has not to be classified as skin or respiratory sensitizer according to 67/548/EEC and 1272/2008/EC (CLP) requirements.</p>
<b>Repeated dose toxicity</b>	<p><u>Oral route</u> 90 d, rat, NOAEL 250 mg/kg bw/ day; OECD 408, GLP; BG Chemie 1990)  NOAEL: 200 mg/kg bw/day (chronic; mouse) <u>Dermal route</u>: no valid study identified <u>Inhalation route</u> 90 d, rat (male/female), NoAEC 638.4 mg/m<sup>3</sup> air (analytical) (male/female) (overall effects)  There is currently no need for classification of effects according to 67/548/EEC and 1272/2008/EC (CLP) requirements due to repeated exposure to the test substance.</p>
<b>Mutagenity</b>	<p>2-EH was not genotoxic in vitro using bacterial and mammalian cell test systems. 2-EH was not mutagenic in bacteria (Salmonella typhimurium strains TA100, TA1535, TA1537, and TA98, with or without metabolic activation) or mammalian cells in vitro (HGPRT and TK), and it did not induce chromosome aberration or sister chromatid exchange in mammalian cells.</p>
<b>Carcinogenity</b>	<p>2 -EH was not carcinogenic in two valid long term rodent studies using rats and mice of either sex.</p>
<b>Toxicity for reproduction</b>	<p>Due to the lack of toxicity on fertility and development in definite studies with 2-ethylhexanol, there is no need for classification according to reproductive toxicity according to 67/548/EEC and 1272/2008/EC (CLP) requirements.</p>

## 12. ECOLOGICAL INFORMATION



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#### Aquatic Toxicity

##### Short-term toxicity to fish

*Leuciscus idus melanotus/fresh water/ flow-through* LC50 (96 h): 17.1 mg/L

*Pimephales promelas/fresh water/ flow-through* LC50 (96 h): 28.2 mg/L

Short term toxicity to fish was moderate

##### Long-term toxicity to fish

According to REACH Annex IX, 9.1, Column 2, the test is not required (CSR does not indicate the need for further investigations).

##### Short-term toxicity to aquatic invertebrates

*Daphnia pulex/freshwater/static* EC50 (48 h) 39 mg/L,

Toxicity to *Daphnia magna* was moderate

##### Long-term toxicity to aquatic invertebrates:

According to EACH Annex IX, 9.1, Column 2, the test is not required (CSR does not indicate the need for further investigations)

##### Algae and aquatic plants

*Scenedesmus subspicatus (new name: Desmodesmus subspicatus)* (algae)/fresh water/static

Toxicity to algae was moderate: EC50 (72 h): 11.5 mg/L test mat. (nominal) based on: biomass

EC50 (72 h): 16.6 mg/L test mat. (nominal) based on: growth rate

##### Toxicity to sediment

The substance is readily biodegradable, the adsorption potential is low (Log K<sub>oc</sub> = 1.42), as is the bioconcentration factor (the estimated Log BCF was 1.4). Direct and indirect exposure to sediment is not likely, since the substance is not intentionally applied to sediment. Therefore, no testing is required in accordance with REACH; ANNEX X; No. 9.5.1, column 2.

##### Resulting PNECs

PNEC aqua (freshwater): 0.017 mg/L

PNEC aqua (marine water): 0.0017 mg/L

PNEC aqua (intermittent releases): 0.17 mg/L

PNEC sediment (freshwater): 0.28 mg/kg sediment dw

PNEC sediment (marine water): 0.028 mg/kg sediment dw

PNEC STP: 10 mg/L mg/L

PNEC soil: 0.047 mg/kg soil dw

##### Toxicity to soil macro-organisms



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The substance is readily biodegradable, and the adsorption potential is low (low Pow and Koc). Direct and indirect exposure to soil is not likely, since the substance is not intentionally applied to soil. Therefore, no testing is required in accordance with REACH; ANNEX X; No. 9.4, column 2.

#### Toxicity to terrestrial plants:

The substance is readily biodegradable, and the adsorption potential is low (low Pow and Koc). Direct and indirect exposure to soil is not likely, since the substance is not intentionally applied to soil. Therefore, no testing is required in accordance with REACH; ANNEX X; No. 9.4, column 2.

#### **12.2. Persistence and degradability:**

Abiotic degradation: substance is readily biodegradable

Biodegradation: 2-ethylhexanol was readily biodegradable in a MITI-I Test, (equivalent to OECD TG 301-C). This is in line with the observation that the chemical oxygen demand (COD) was reduced by >95% in the Zahn-Wellens test (OECD 302B guideline; reliability 2) within 5 days demonstrating rapid biodegradation.

#### **12.3. Bioaccumulative potential:**

In accordance with column 2 of Annex IX, the study does not need to be conducted if the substance has a low potential for bioaccumulation. The log Pow of 2.9 for 2-Ethylhexanol (Perstorp, 2010) indicates a low potential for bioaccumulation. In addition the substance is readily biodegradable (NITE, 2002). Therefore and for reasons of animal welfare a fish study is not performed.

Secondary poisoning: No information available. Due to the low log P<sub>ow</sub> of the substance, bioaccumulation is unlikely.

#### **12.4. Mobility**

Water: 2-Ethylhexanol will slowly evaporate from the water surface into the atmosphere. 2-Ethylhexanol is readily biodegradable in water.

Soil and sediments: The log Pow of 2.9 for 2-Ethylhexanol (Perstorp, 2010) indicates a low potential for bioaccumulation. Low values for Koc calculated with a QSAR tool also point to low absorption to soil. In addition the substance is readily biodegradable (NITE, 2002).

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

Based on the available data it is concluded that 2-EH

- is readily biodegradable and does not fulfil the P or vP criterion
- is not bioaccumulative and does not fulfil the B or vB criterion
- does not fulfil the T criterion

and therefore is evaluated to be not a PBT or vPvB substance.



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## SAFETY DATA SHEET-extended

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## 13. DISPOSAL CONSIDERATIONS

This section contains generic advice and guidance.

### 13.1 Waste treatment methods

#### 13.1.1 Product

Methods of disposal : The generation of waste should be avoided or minimised wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spill material and runoff and contact with soil, waterways, drains and sewers.

#### 13.1.2. Packaging

Methods of disposal : The generation of waste should be avoided or minimised wherever possible. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible.

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## 14. TRANSPORT INFORMATION

**ADR:** 2-Ethylhexanol is not classified under ADR regulations.

**RID:** 2-Ethylhexanol is not classified under RID regulations.

**Maritime transport IMDG:** 2-Ethylhexanol is not classified under IMDG regulations.

**Air transport ICAO/IATA:** 2-Ethylhexanol is not classified under IATA regulations.



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## **15. REGULATORY INFORMATION**

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

EU Regulation (EC) No. 1907/2006 (REACH)

#### **Annex XIV - List of substances subject to authorisation**

Substances of very high concern (Authorizations): 2-Ethylhexanol is not listed

#### **Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles**

Restrictions on use:                      no restriction

Other EU regulations:                      2-Ethylhexanol is a SEVESO substance, not ozone depleting substance and not a persistent organic pollutant.

WGK (Germany):                              WGK 2

### **15.2 Chemical safety Assessment**

A chemical safety assessment has been carried out for this substance.

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## **16. OTHER INFORMATION**

### **16.1. Full text of H-Statements referred to under sections 2 and 3**

H335: May cause respiratory irritation.

H315: Causes skin irritation.

H319: Causes serious eye irritation.

H332: Harmful if inhaled.

### **16.2 Full text of R-phrases referred to under sections 2 and 3**



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R20 – Harmful by inhalation

R36/37/38 - Irritating to eyes, respiratory system and skin

#### 16.3. Full text of P-Statements referred to under sections 2 and 3.

P233: Keep container tightly closed.

P261: Avoid breathing dust/fume/gas/mist/vapours/spray.

P280: Wear protective gloves/protective clothing/eye protection/face protection.

P302+P352: IF ON SKIN: Wash with plenty of soap and water.

P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P312: Call a POISON CENTER or doctor/physician if you feel unwell.

P362: Take off contaminated clothing and wash before reuse.

#### 16.4. Full text of S-Statements referred to under sections 2 and 3.

S26 - in case of contact with eyes, rinse immediately with plenty of water and seek medical advice

S37 - Wear suitable gloves.

#### 16.5. Explanations for possible abbreviations mentioned in above sections

PBT: Persistent, bioaccumulative and toxic.

vPvB: Very persistent and very bioaccumulative.

ES: Exposure Scenario

WGK: Wassergefährdungsklasse (Water hazard class)

PNEC: Predicted No-Effect Concentration

NOAEC: No Observed Adverse Effect Concentration

ADR: European **Agreement** concerning the International Carriage of **Dangerous** Goods by **Road**

RID: **International** Carriage of **Dangerous** Goods by **Road**

IMDG Code: International Maritime Dangerous Goods Code

ICAO/IATA: International Civil Aviation Organization/ International Air Transport Association.

#### 16.6. Revision: Revision 0

This is the first version of the eSDS of 2-Ethylhexanol. Hence, no revision information should be mentioned here.

#### Annex I to SDS- Exposure Scenario



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#### Disclaimer:

Oltchim provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. The information is intended to aid the user in controlling the handling risks; it is not to be construed as a warranty or specification of the product quality.

The information may not be or may not altogether be applicable to combinations of the product with other substances or to particular applications. The user is responsible for ensuring that appropriate precautions are taken and for satisfying themselves that the data are suitable and sufficient for the product's intended purpose. In case of any unclarity we advise consulting the supplier or an expert.

## ANNEX I- EXPOSURE SCENARIO

### 1. Exposure Scenario for Manufacture of substance (ES 1)

<b>Exposure Scenario 1: Manufacture of substance</b>	
Industrial use: SU 3 (SU 8,9)	
Environmental exposure scenario: ESVOCSPERC 1. ERC 1, ERC4	
Workers scenario ESVOC GES 1A (industrial); PROC 1, 2, 3, 4, 8a, 8b, 9, 15	
Manufacture of the substance or use as an intermediate or process chemical or extraction agent. Includes recycling/ recovery, material transfers, storage, maintenance and loading (including marine vessel/barge, road/rail car and bulk container), sampling and associated laboratory activities	
<b>Environmental exposure</b>	
Based on ESVOC spERC: ESVOC 1.1b.v1	
Manufacture of the substance or use as an intermediate or process chemical or extraction agent. Includes recycling/ recovery, material transfers, storage, maintenance and loading (including marine vessel/barge, road/rail car and bulk container), sampling and associated laboratory activities	
<b>Product characteristics</b>	
Physical state	Liquid
Vapour pressure of substance	< 100 Pa at 20°C
Concentration of substance in mixture	N/A
<b>Amounts used</b>	
Annual amount (per industrial use)	50000 t/a
Daily amount (per site for industrial use) (M <sub>use</sub> )	140 t/d (calculated by ECETOC TRA)
<b>Frequency and duration of use</b>	
Continuous use/release	
<b>Environment factors not influenced by risk management</b>	
Flow rate of receiving surface water	120 m <sup>3</sup> /second (ECETOC TRA default)
<b>Other given operational conditions affecting environmental</b>	
Processing setting (indoor/outdoor)	Indoor and outdoor use
Processing temperature and pressure	Ambient temperature and pressure
<b>Technical conditions and measures at process level (source) to prevent release</b>	
none	
<b>Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to</b>	



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Industrial sewage treatment plant	No
<b>Organizational measures to prevent/limit release from site</b>	
None	
<b>Conditions and measures related to municipal sewage treatment plant</b>	
Municipal sewage treatment plant	yes
STP discharge rate	2 x 10 <sup>3</sup> m <sup>3</sup> /day (ECETOC TRA default)
Efficacy (substance removal in STP)	88% (calculated by ECETOC TRA)
Sludge treatment technique	disposal or recovery
<b>Conditions and measures related to external treatment of waste for disposal</b>	
Dispose of waste solvent or used containers according to local regulations [ENVT12]	
<b>Conditions and measures related to external recovery of waste</b>	
<p>Process optimized for highly efficient use of raw materials (very minimal environmental release). Volatile compounds subject to air emission controls. Negligible wastewater emissions as process operates without water contact. Negligible air emissions as process operates in a contained system. Wastewater emissions generated from equipment cleaning with water.</p>	
<b>Additional good practice advice (for environment) beyond the REACH CSA</b>	
None	
<b>Worker exposure</b>	
Based on ESVOC GES 1A: Distribution of substance (industrial), low volatility solvent with DNEL inhalation ≥ 10 ppm, DNEL dermal ≥ 5 mg/kg/d	
<b>Product characteristics</b>	
Physical state	Liquid
Vapour pressure of substance	< 100 Pa at 20°C
Concentration of substance in mixture	Pure substance (up to 100%)
<b>Amounts used</b>	
Not relevant for ECETOC TRA exposure estimates	
<b>Frequency and duration of use/exposure</b>	
Frequency and duration	Covers daily exposures up to 8 hours
<b>Human factors not influenced by risk management</b>	
Potentially exposed body parts	Hands No special precautions identified' <b>EI18 Wear gloves PPE15</b>
Exposed skin surface	The extent of hand exposure (one hand or both hands, one side or both sides) differs between different PROCs, with the following values assumed in ECETOC TRA: 240 cm <sup>2</sup> (PROC1, 3, 15), 480 cm <sup>2</sup> (PROC2, 4, 8B,) or 960 cm <sup>2</sup> (PROC8A)
<b>Other given operational conditions affecting workers exposure</b>	



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Setting (indoor/outdoor)	Indoor and outdoor use
Room size	Not relevant for ECETOC TRA exposure estimates
Processing temperature and pressure	Assumes use at not more than 20°C above ambient temperature [G15]
<b>Technical conditions and measures at process level (source) to prevent release</b>	
<ul style="list-style-type: none"> <li>- <i>General exposures (closed systems) CS15</i> : Handle substance within a closed system E49 Ensure samples are collected under containment or extract ventilation. E66 Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour) E40 Wear suitable gloves tested to EN374. PPE15</li> <li>- <i>General exposures (open systems) CS16</i> : Provide extract ventilation to points where emissions occur E54. Wear suitable gloves tested to EN374. PPE15</li> <li>- <i>Process sampling CS2</i> : Ensure samples are collected under containment or extract ventilation. E76 Wear suitable gloves tested to EN374. PPE15 Ensure operatives are trained to minimise exposures EI19</li> <li>- <i>Bulk transfers (closed systems) CS14, CS107</i> : Handle substance within a closed system. E47 Ensure material transfers are under containment or extract ventilation E66 Wear suitable gloves tested to EN374. PPE15</li> <li>- <i>Clear transfer lines prior to decoupling E39</i> Remotely vent displaced vapours ENVT17</li> <li>- <i>Bulk transfers (open systems) CS14, CS108</i> : Handle substance within a closed system. E47 Ensure material transfers are under containment or extract ventilation E66 Wear suitable gloves tested to EN374. PPE15</li> <li>- <i>Clear transfer lines prior to decoupling E39</i> Remotely vent displaced vapours ENVT17</li> <li>- <i>Equipment maintenance CS5</i> : Drain down system prior to equipment break-in or maintenance E65 Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour) E40 Wear suitable gloves tested to EN374. PPE15 Deal with spills immediately. C&amp;H13. Retain drain downs in sealed storage pending disposal or for subsequent recycle. ENVT4</li> <li>- <i>Laboratory activities CS36</i> : Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour) E40 Handle in a fume cupboard or under extract ventilation E83</li> <li>- <i>Storage CS67</i>: Store substance within a closed system. E84 Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour) E40 Avoid dip samples E42</li> </ul>	
<b>Organisational measures to prevent /limit releases, dispersion and exposure</b>	
Close process. No exposure	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
PPE to prevent dermal exposure	<ul style="list-style-type: none"> <li>- Wear suitable gloves tested to EN374 [PPE15] for activities, where direct contact with substance is possible</li> <li>- Wear suitable coveralls to prevent exposure to the skin [PPE27] for activities, where direct contact with substance is possible</li> </ul>
PPE to prevent eye exposure	- Use suitable eye protection [PPE26], where direct contact (e.g. splashes) with substance is possible
Respiratory protection	Not required Estimated workplace exposures are not expected to exceed DNELs when the identified risk management measures are adopted .G8
Ventilation	For PROC8a only: LEV required
Efficiency rate	



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#### Additional good practice advice (for environment) beyond the REACH CSA

None

## 2. Exposure Scenario for Distribution of substance (ES 2)

Exposure Scenario 2: Distribution of substance	
Industrial use: SU 3 (SU 10)	
Environmental exposure scenario: ESVOC 3, spERC 1.1b.v1 (specifies ERC 1, 2)	
Workers scenario ESVOC GES 1A (industrial); PROC 1, 2, 3, 4, 8a, 8b, 9, 15	
Loading (including marine vessel/barge, rail/road car and IBC loading) and repacking (including drums and small packs) of substance, including its sampling, storage, unloading and associated laboratory activities	
Environmental exposure	
Based on ESVOC spERC: ESVOC 3 (ECETOC TRA) = spERC 1.1b.v1	
Loading (including marine vessel/barge, rail car and IBC loading) and repacking (including drums and small packs), including losses during off-site storage (e.g. terminals)	
Product characteristics	
Physical state	Liquid
Vapour pressure of substance	< 100 Pa at 20°C
Concentration of substance in mixture	N/A
Amounts used	
Annual amount (per industrial use)	200.000 t/a
Daily amount (per site for industrial use) ( $M_{use}$ )	1.3 t/d (calculated by ECETOC TRA)
$M_{safe}$	20 t/d (calculated by ECETOC TRA)
Frequency and duration of use	
Continuous use/release	
Environment factors not influenced by risk management	
Flow rate of receiving surface water	18000 m <sup>3</sup> /day (ECETOC TRA default)
Other given operational conditions affecting environmental	
Processing setting (indoor/outdoor)	Indoor and outdoor use
Processing temperature and pressure	Ambient temperature and pressure
Technical conditions and measures at process level (source) to prevent release	
none	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to	
Industrial sewage treatment plant	No
Organizational measures to prevent/limit release from site	
None	
Conditions and measures related to municipal sewage treatment plant	
Municipal sewage treatment plant	yes
STP discharge rate	2 x 10 <sup>3</sup> m <sup>3</sup> /day (ECETOC TRA default)
Efficacy (substance removal in STP)	88% (calculated by ECETOC TRA)
Sludge treatment technique	disposal or recovery
Conditions and measures related to external treatment of waste for disposal	
Dispose of waste solvent or used containers according to local regulations [ENVT12]	
Conditions and measures related to external recovery of waste	



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None	
<b>Additional good practice advice (for environment) beyond the REACH CSA</b>	
None	
<b>Worker exposure</b>	
Based on ESVOG GES 1A: Distribution of substance (industrial), low volatility solvent with DNEL inhalation ≥ 10 ppm, DNEL dermal ≥ 5 mg/kg/d	
<b>Product characteristics</b>	
Physical state	Liquid
Vapour pressure of substance	< 100 Pa at 20°C
Concentration of substance in mixture	Pure substance (up to 100%)
<b>Amounts used</b>	
Not relevant for ECETOC TRA exposure estimates	
<b>Frequency and duration of use/exposure</b>	
Frequency and duration	Covers daily exposures up to 8 hours on 5 days/week
<b>Human factors not influenced by risk management</b>	
Potentially exposed body parts	Hands
Exposed skin surface	The extent of hand exposure (one hand or both hands, one side or both sides) differs between different PROCs, with the following values assumed in ECETOC TRA: 240 cm <sup>2</sup> (PROC1, 3, 15), 480 cm <sup>2</sup> (PROC2, 4, 8B, 9) or 960 cm <sup>2</sup> (PROC8A)
<b>Other given operational conditions affecting workers exposure</b>	
Setting (indoor/outdoor)	Indoor and outdoor use
Room size	Not relevant for ECETOC TRA exposure estimates
Processing temperature and pressure	Assumes use at not more than 20°C above ambient temperature [G15]
<b>Technical conditions and measures at process level (source) to prevent release</b>	
<ul style="list-style-type: none"> <li>- <i>General exposures (Closed systems) CS15:</i> Handle substance within a closed system. E47 Ensure material transfers are under containment or extract ventilation E66</li> <li>- <i>General exposures (Open systems) CS16:</i> Ensure material transfers are under containment or extract ventilation [E66] Clear transfer lines prior to de-coupling E39</li> <li>- <i>Process sampling [CS2]:</i> Ensure material transfers are under containment or extract ventilation E66 Avoid dip sampling E42</li> <li>- <i>Laboratory activities [CS36]:</i> Handle in a fume cupboard or under extract ventilation E83</li> <li>- <i>Bulk transfers CS14:</i> Ensure material transfers are under containment or extract ventilation E66 Clear lines transfer lines prior to decoupling E38 Ensure operation is undertaken outdoors E69</li> <li>- <i>Drum and small pack filling CS6:</i> Fill containers/cans at dedicated fill points supplied with local extract ventilation E51 Clear spills immediately C&amp;H13 Put lids on containers immediately after use E9</li> <li>- <i>Equipment cleaning and maintenance [CS39]:</i> Apply vessel entry procedures including use of forced supplied air. AP15 Drain down and flush system prior to equipment break-in or maintenance. E55 Transfer via enclosed lines E52 Retain drain downs in sealed storage pending disposal or for subsequent recycle. ENVT4</li> <li>- <i>Material Storage CS67:</i> Store substance within a closed system. E84 Transfer via enclosed lines. E52 Avoid</li> </ul>	



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dip sampling E42	
Ventilation	
For PROC8a only: LEV required	
Efficiency rate	
90%	
<b>Organisational measures to prevent /limit releases, dispersion and exposure</b>	
- Provide a good standard of general ventilation. Natural ventilation is from windows and doors etc. Controlled ventilation means air is supplied or removed by a powered fan [E1] - Avoid manual contact with wet work pieces [EI17] - Avoid splashing [C&H15] - Assumes a good basic standard of occupational hygiene is implemented [G1]	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
PPE to prevent dermal exposure	- Wear suitable gloves tested to EN374 [PPE15] for activities, where direct contact with substance is possible - Wear suitable coveralls to prevent exposure to the skin [PPE27] for activities, where direct contact with substance is possible
PPE to prevent eye exposure	- Use suitable eye protection [PPE26], where direct contact (e.g. splashes) with substance is possible
Respiratory protection	Not required
<b>Additional good practice advice (for environment) beyond the REACH CSA</b>	
None	

### 3. Exposure Scenario for Formulation of substance (ES 3)

<b>Exposure Scenario 3: Formulation of substance</b>	
Industrial use: SU 3 (SU 10)	
Environmental exposure scenario: ESVOC 4, spERC 2.2.v1 (specifies ERC 2)	
Workers scenario ESVOC GES 2 (industrial); PROC1, 2, 3, 4, 5, 8a, 8b, 9, 14, 15	
Formulation, blending, 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 and associated laboratory activities.	
<b>Environmental exposure</b>	
Based on ESVOC spERC: ESVOC 4 (ECETOC TRA) = spERC 2.2.v1	
Formulation & packing of mixtures in batch or continuous operations, including storage, materials transfers, large and small scale packing, and maintenance	
<b>Product characteristics</b>	
Physical state	Liquid
Vapour pressure of substance	< 100 Pa at 20°C
Concentration of substance in mixture	N/A
<b>Amounts used</b>	
Annual amount (per site for industrial use)	400 t/a
Daily amount (per site for industrial use) (M <sub>use</sub> )	1.33 t/d (calculated by ECETOC TRA)



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M <sub>safe</sub>	1.36 t/d (calculated by ECETOC TRA)
<b>Frequency and duration of use</b>	
Use/release on 300 d/year	
<b>Environment factors not influenced by risk management</b>	
Flow rate of receiving surface water	18000 m <sup>3</sup> /day (ECETOC TRA default)
<b>Other given operational conditions affecting environmental exposure</b>	
Processing setting (indoor/outdoor)	Indoor
Processing temperature and pressure	Ambient temperature and pressure
<b>Technical conditions and measures at process level (source) to prevent release</b>	
None	
<b>Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil</b>	
Industrial sewage treatment plant	No
<b>Organizational measures to prevent/limit release from site</b>	
None	
<b>Conditions and measures related to municipal sewage treatment plant</b>	
Municipal sewage treatment plant	yes
STP discharge rate	2 x 10 <sup>3</sup> m <sup>3</sup> /day (ECETOC TRA default)
Efficacy (substance removal in STP)	88% (calculated by ECETOC TRA)
Sludge treatment technique	disposal or recovery
Dispose of waste solvent or used containers according to local regulations [ENVT12]	
<b>Conditions and measures related to external recovery of waste</b>	
None	
<b>Additional good practice advice (for environment) beyond the REACH CSA</b>	
None	
<b>Worker exposure</b>	
Based on ESVOG GES 2: Formulation and (re-)packing of substances and mixtures (industrial), low volatility solvent with DNEL inhalation ≥ 10 ppm, DNEL dermal ≥ 5 mg/kg/d	
<b>Product characteristics</b>	
Physical state	Liquid
Vapour pressure of substance	< 100 Pa at 20°C
Concentration of substance in mixture	Covers percentage substance in the product up to 100 % (unless stated differently) [G13]
<b>Amounts used</b>	
Not relevant for ECETOC TRA exposure estimates	
<b>Frequency and duration of use/exposure</b>	
Frequency and duration	Covers daily exposures up to 8 hours (unless stated differently) [G2]
<b>Human factors not influenced by risk management</b>	
Potentially exposed body parts	Hands
Exposed skin surface	The extent of hand exposure (one hand or both hands, one side or both sides) differs between different PROCs, with the following values



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	assumed in ECETOC TRA: 240 cm <sup>2</sup> (PROC1, 3, 15), 480 cm <sup>2</sup> (PROC2, 4, 5, 8B, 9, 14) or 960 cm <sup>2</sup> (PROC8A)
<b>Other given operational conditions affecting workers exposure</b>	
Setting (indoor/outdoor)	Indoor use
Room size	Not relevant for ECETOC TRA exposure estimates
Processing temperature and pressure	Assumes use at not more than 20°C above ambient temperature [G15]
<b>Technical conditions and measures at process level (source) to prevent release</b>	
<ul style="list-style-type: none"> <li>- <i>General exposures (closed systems)</i> CS15: Handle substance within a closed system. E47 Ensure material transfers are under containment or extract ventilation E66</li> <li>- <i>General exposures (open systems)</i> CS16: Provide extract ventilation to points where emissions occur E54</li> <li>- <i>Batch processes at elevated temperatures</i> CS136: Formulate in enclosed or ventilated mixing vessels E46 Ensure material transfers are under containment or extract ventilation E66</li> <li>- <i>Process sampling</i> CS2: Ensure material transfers are under containment or extract ventilation E66 Avoid dip sampling. E42</li> <li>- <i>Laboratory activities</i> CS36: Handle in a fume cupboard or under extract ventilation E83</li> <li>- <i>Bulk transfers</i> CS14: Ensure material transfers are under containment or extract ventilation E66 Clear lines prior to decoupling. E39 Clear spillages immediately C&amp;H13 Remotely vent displaced vapours ENVT17</li> <li>- <i>Mixing operations (open systems)</i> CS30: Provide extract ventilation to points where emissions occur E54</li> <li>- <i>Drum and batch transfers</i> CS8: Provide extract ventilation to points where emissions occur E54 Use drum pumps or carefully pour from container. E64 Avoid spillage when withdrawing pump. C&amp;H16</li> <li>- <i>Production or preparation of articles by tableting, compression, extrusion or pelletisation</i> CS100: Handle substance within a predominantly closed system provided with extract ventilation E49</li> <li>- <i>Drum and small package filling</i> CS6: Fill containers/cans at dedicated fill points supplied with local extract ventilation E51 Put lids on containers immediately after use. E9 Clear spills immediately C&amp;H13</li> <li>- <i>Equipment clean down and maintenance</i> CS39: Apply vessel entry procedures including use of forced supplied air. AP15 Drain down and flush system prior to equipment break-in or maintenance. E55 Transfer via enclosed lines E52 Retain drain downs in sealed storage pending disposal or for subsequent recycle. ENVT4</li> <li>- <i>Material storage</i> CS67: Store substance within a closed system. E84 Transfer via enclosed lines. E52 Avoid dip sampling E42</li> </ul>	
Ventilation	- For PROC5 and PROC8a only: LEV required
Efficiency rate	90%
<b>Organisational measures to prevent /limit releases, dispersion and exposure</b>	
<ul style="list-style-type: none"> <li>- Provide a good standard of general ventilation. Natural ventilation is from windows and doors etc. Controlled ventilation means air is supplied or removed by a powered fan [E1]</li> <li>- Avoid manual contact with wet work pieces [EI17]</li> <li>- Avoid splashing [C&amp;H15]</li> <li>- Assumes a good basic standard of occupational hygiene is implemented [G1]</li> </ul>	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
PPE to prevent dermal exposure	<ul style="list-style-type: none"> <li>- Wear suitable gloves tested to EN374 [PPE15] for activities, where direct contact with substance is possible</li> <li>- Wear suitable coveralls to prevent exposure to</li> </ul>



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	the skin [PPE27] for activities, where direct contact with substance is possible
PPE to prevent eye exposure	- Use suitable eye protection [PPE26], where direct contact (e.g. splashes) with substance is possible
Respiratory protection	Not required
<b>Additional good practice advice (for environment) beyond the REACH CSA</b>	
None	

#### 4. Exposure Scenario for Use in coatings (industrial) (ES 4)

<b>Exposure Scenario 4: Use in coatings (industrial)</b>	
Industrial use: SU 3	
Environmental exposure scenario: ESVOC 5, spERC 4.3a.v1 (specifies ERC 4)	
Workers scenario ESVOC GES 3 (industrial); PROC 1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 13, 14, 15	
Covers the use in coatings (paints, inks, adhesives, etc) including exposures during use (including materials receipt, storage, preparation and transfer from bulk and semi-bulk, application by spray, roller, spreader, dip, flow, fluidised bed on production lines and film formation) and equipment cleaning, maintenance and associated laboratory activities.	
<b>Environmental exposure</b>	
Based on ESVOC spERC: ESVOC 5 (ECETOC TRA) = spERC 4.3a.v1	
Covers the use in coatings (paints, inks, adhesives, etc) including exposures during use (including materials transfer from bulk and semi-bulk and spraying, brushing and other manual application tasks); and equipment cleaning	
<b>Product characteristics</b>	
Physical state	Liquid
Vapour pressure of substance	< 100 Pa at 20°C
Concentration of substance in mixture	Covers percentage substance in the product up to 100 % (unless stated differently) [G13]
<b>Amounts used</b>	
Annual amount per site for industrial use)	100 t/a
Daily amount (per site for industrial use) (M <sub>use</sub> )	333 kg/d (calculated by ECETOC TRA)
M <sub>safe</sub>	387 kg/d (calculated by ECETOC TRA)
<b>Frequency and duration of use</b>	
Use/release on 300 d/year	
<b>Environment factors not influenced by risk management</b>	
Flow rate of receiving surface water	18.000 m <sup>3</sup> /day (ECETOC TRA default)
<b>Other given operational conditions affecting environmental exposure</b>	
Processing setting (indoor/outdoor)	Indoor and outdoor use



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Processing temperature and pressure	Ambient temperature and pressure
<b>Technical conditions and measures at process level (source) to prevent release</b>	
None	
<b>Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil</b>	
Industrial sewage treatment plant	No
<b>Organizational measures to prevent/limit release from site</b>	
None	
<b>Conditions and measures related to municipal sewage treatment plant</b>	
Municipal sewage treatment plant	yes
STP discharge rate	2 x 10 <sup>3</sup> m <sup>3</sup> /day (ECETOC TRA default)
Efficacy (removal in STP)	88% (calculated by ECETOC TRA)
Sludge treatment technique	disposal or recovery
<b>Conditions and measures related to external treatment of waste for disposal</b>	
Dispose of waste solvent or used containers according to local regulations [ENVT12]	
<b>Conditions and measures related to external recovery of waste</b>	
None	
<b>Additional good practice advice (for environment) beyond the REACH CSA</b>	
None	
<b>Worker exposure</b>	
Based on ESVOG GES 3: Coatings (industrial application), low volatility solvent with DNEL inhalation ≥ 10 ppm, DNEL dermal ≥ 5 mg/kg/d	
<b>Product characteristics</b>	
Physical state	Liquid
Vapour pressure of substance	< 100 Pa at 20°C
Concentration of substance in mixture	Covers percentage substance in the product up to 100 % (unless stated differently) [G13]
<b>Amounts used</b>	
Not relevant for ECETOC TRA exposure estimates	
<b>Frequency and duration of use/exposure</b>	
Frequency and duration	Covers daily exposures up to 8 hours (unless stated differently) [G2]
<b>Human factors not influenced by risk management</b>	
Potentially exposed body parts	Hands and forearms
Exposed skin surface	The extent of hand exposure (one hand or both hands, one side or both sides) differs between different PROCs; exposure of forearms is only assumed in industrial spraying activities (PROC7), the following range of values is assumed in ECETOC TRA: 240 cm <sup>2</sup> (e.g. PROC1) – 1500 cm <sup>2</sup> (PROC7)
<b>Other given operational conditions affecting workers exposure</b>	
Setting (indoor/outdoor)	Indoor and outdoor use



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Room size	Not relevant for ECETOC TRA exposure estimates
Processing temperature and pressure	Assumes use at not more than 20°C above ambient temperature [G15]
<b>Technical conditions and measures at process level (source) to prevent release</b>	
<p><i>General exposures (closed systems)</i> [CS15]: Handle substance within a closed system [E47].</p> <p><i>General exposures (closed systems)</i> [CS15] with sample collection [CS56]. Use in contained systems [CS38]: Handle substance within a closed system [E47]. Ensure material transfers are under containment or extract ventilation [E66].</p> <p><i>Film formation - force drying (50 - 100°C). Stoving (&gt;100°C). UV/EB radiation curing</i> [CS94]: Handle substance within a closed system [E47]. Ensure material transfers are under containment or extract ventilation [E66].</p> <p>Mixing operations (closed systems) [CS29]. <i>General exposures (closed systems)</i> [CS15]: Handle substance within a closed system [E47].</p> <p>Film formation - air drying [CS95]: Provide extract ventilation to points where emissions occur [E54].</p> <p>Preparation of material for application [CS96]. <i>Mixing operations (open systems)</i> [CS30]: Provide extract ventilation to points where emissions occur [E54].</p> <p>Spraying (automatic/robotic) [CS97]: Carry out in a vented booth provided with laminar airflow [E59].</p> <p><i>Manual</i> [CS34] <i>Spraying</i> [CS10]: Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour) [E40].</p> <p>Material transfers [CS3]: Clear transfer lines prior to de-coupling [E39]. Provide extract ventilation to points where emissions occur [E54].</p> <p>Roller, spreader, flow application [CS98]: Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings [E60].</p> <p>Dipping, immersion and pouring [CS4]: Provide extract ventilation to points where emissions occur [E54]. Clear up spills immediately and dispose of waste safely [E19].</p> <p>Laboratory activities [CS36]: {Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour) [E40]}. Provide extract ventilation to points where emissions occur [E54].</p> <p>Material transfers [CS3]. <i>Drum/batch transfers</i> [CS8]. <i>Transfer from/pouring from containers</i> [CS22]: Ensure transfer points are supplied with extract ventilation [E73].</p> <p><i>Production or preparation or articles by tableting, compression, extrusion or pelletisation</i> [CS100]: Provide extract ventilation to points where emissions occur [E54].</p>	
<b>Technical conditions and measures to control dispersion from source towards the worker</b>	
Ventilation	LEV is required for: - PROCs 5, 7, 8a, 10, 13 and - PROC2: for film formation - force drying (50-100°C), stoving (>100°C). UV/EB radiation curing (PROC2) due to elevated temperatures
Efficiency rate	95% (PROC7) and 90% (PROCs 5, 8a, 10, 13)
<b>Organisational measures to prevent /limit releases, dispersion and exposure</b>	
<ul style="list-style-type: none"> <li>- Provide a good standard of general ventilation. Natural ventilation is from windows and doors etc. Controlled ventilation means air is supplied or removed by a powered fan [E1]</li> <li>- Avoid manual contact with wet work pieces [EI17]</li> <li>- Avoid splashing [C&amp;H15]</li> <li>- Assumes a good basic standard of occupational hygiene is implemented [G1]</li> </ul>	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	



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PPE to prevent dermal exposure	- Wear suitable gloves tested to EN374 [PPE15] for activities, where direct contact with substance is possible - Wear suitable coveralls to prevent exposure to the skin [PPE27] for activities, where direct contact with substance is possible
PPE to prevent eye exposure	- Use suitable eye protection [PPE26], where direct contact (e.g. splashes) with substance is possible
Respiratory protection	For PROC7: open manual industrial spraying (if LEV is not feasible): Wear a respirator conforming to EN140 with Type A filter or better [PPE22]. For all other activities: Not required
Respiratory PPE efficacy	90%
<b>Additional good practice advice (for environment) beyond the REACH CSA</b>	
None	

## 5. Exposure Scenario for Use in coatings (professional) (ES 5)

<b>Exposure Scenario 5: Use in coatings (professional)</b>	
Professional use: SU 22	
Environmental exposure scenario: ESVOC 6, spERC 8.3b.v1 (specifies ERC 8a,d)	
Workers scenario ESVOC GES 3 (professional); PROC 1, 2, 3, 4, 5, 8a, 8b, 10, 11, 13, 15, 19	
Covers the use in coatings (paints, inks, adhesives, etc) including exposures during use (including materials receipt, storage, preparation and transfer from bulk and semi-bulk, application by spray, roller, brush, spreader by hand or similar methods, and film formation), and equipment cleaning, maintenance and associated laboratory activities.	
<b>Environmental exposure</b>	
Based on ESVOC spERC: ESVOC 6 (ECETOC TRA) = spERC 8.3b.v1	
Covers the use in coatings (paints, inks, adhesives, etc) including exposures during use (including materials transfer and spraying, brushing and other manual application tasks); and equipment cleaning	
<b>Product characteristics</b>	
Physical state	Liquid
Vapour pressure of substance	< 100 Pa at 20°C
Concentration of substance in mixture	Covers percentage substance in the product up to 100 % (unless stated differently) [G13]
<b>Amounts used</b>	
Annual amount (total for EU)	100 t/a
Daily amount (M <sub>use</sub> )	0.137 kg/d (calculated by ECETOC TRA)
M <sub>safe</sub>	2.25 kg/d (calculated by ECETOC TRA)
<b>Frequency and duration of use</b>	
Continuous use/release	
<b>Environment factors not influenced by risk management</b>	
Flow rate of receiving surface water	18.000 m <sup>3</sup> /day (ECETOC TRA default)



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<b>Other given operational conditions affecting environmental exposure</b>	
Processing setting (indoor/outdoor)	Indoor and outdoor use
Processing temperature and pressure	Ambient temperature and pressure
<b>Technical conditions and measures at process level (source) to prevent release</b>	
None	
<b>Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil</b>	
Industrial sewage treatment plant	No
<b>Organizational measures to prevent/limit release from site</b>	
None	
<b>Conditions and measures related to municipal sewage treatment plant</b>	
Municipal sewage treatment plant	yes
STP discharge rate	2 x 10 <sup>3</sup> m <sup>3</sup> /day (ECETOC TRA default)
Efficacy (substance removal in STP)	88% (calculated by ECETOC TRA)
Sludge treatment technique	disposal or recovery
<b>Conditions and measures related to external treatment of waste for disposal</b>	
Dispose of waste solvent or used containers according to local regulations [ENVT12]	
<b>Conditions and measures related to external recovery of waste</b>	
None	
<b>Additional good practice advice (for environment) beyond the REACH CSA</b>	
None	
<b>Worker exposure</b>	
Based on ESVOG GES 3: Coatings (professional application), low volatility solvent with DNEL inhalation ≥ 10 ppm, DNEL dermal ≥ 5 mg/kg/d	
<b>Product characteristics</b>	
Physical state	Liquid
Vapour pressure of substance	< 100 Pa at 20°C
Concentration of substance in mixture	Covers percentage substance in the product up to 100 % (unless stated differently) [G13]
<b>Amounts used</b>	
Not relevant for ECETOC TRA exposure estimates	
<b>Frequency and duration of use/exposure</b>	
Frequency and duration	PROC11: Indoors: Avoid carrying out operation for more than 1 hour [OC11] Outdoors: Avoid carrying out operation for more than 4 hours [OC12]. PROC19: Avoid carrying out operation for more than 1 hour [OC11] All others: Covers daily exposures up to 8 hours (unless stated differently) [G2]
<b>Human factors not influenced by risk management</b>	



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Potentially exposed body parts	Hands and forearms
Exposed skin surface	The extent of hand exposure (one hand or both hands, one side or both sides) differs between different PROCs; exposure of forearms is only assumed in non-industrial spraying activities (PROC11), the following range of values is assumed in ECETOC TRA: 240 cm <sup>2</sup> (e.g. PROC3) – 1980 cm <sup>2</sup> (PROC19)
<b>Other given operational conditions affecting workers exposure</b>	
Setting (indoor/outdoor)	Indoor and outdoor use
Room size	Not relevant for ECETOC TRA exposure estimates
Processing temperature and pressure	Assumes use at not more than 20°C above ambient temperature <b>[G15]</b>
<b>Technical conditions and measures at process level (source) to prevent release</b>	
<p><i>General exposures (closed systems) [CS15]:</i> Handle substance within a closed system [E47].</p> <p><i>Filling / preparation of equipment from drums or containers. [CS45]:</i> Handle substance within a closed system [E47]. <b>Use drum pumps or carefully pour from container</b> [E64].</p> <p><i>General exposures (closed systems) [CS15]. Use in contained systems [CS38]:</i> Handle substance within a closed system [E47].</p> <p><i>Preparation of material for application [CS96]:</i> <b>Use drum pumps or carefully pour from container</b> [E64]. <b>Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings</b> [E60]. <b>Clear up spills immediately and dispose of waste safely</b> [E19].</p> <p><i>Film formation - air drying [CS95]. Outdoor [OC9]:</i></p> <p><i>Film formation - air drying [CS95]. Indoor [OC8]:</i> Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour) [E40]. <b>Provide extract ventilation to points where emissions occur</b> [E54]}.</p> <p><i>Preparation of material for application [CS96]. Indoor [OC8]:</i> Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour) [E40].</p> <p><i>Preparation of material for application [CS96]. Outdoor [OC9]:</i> Avoid carrying out operation for more than 4 hours [OC12]., or: [G9].</p> <p><i>Material transfers [CS3]. Drum/batch transfers [CS8]:</i> Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings (professional use) [E78]. <b>Use drum pumps or carefully pour from container</b> [E64].</p> <p><i>Manual [CS34]. Spraying [CS10]. Indoor [OC8]:</i> Carry out in a vented booth [E57]</p> <p><i>Manual [CS34]. Spraying [CS10]. Outdoor [OC9]:</i> Ensure operation is undertaken outdoors [E69].</p> <p><i>Dipping, immersion and pouring [CS4]. Indoor [OC8]:</i> Provide extract ventilation to points where emissions occur [E54]. <b>Clear up spills immediately and dispose of waste safely</b> [E19].</p> <p><i>Dipping, immersion and pouring [CS4]. Outdoor [OC9]:</i> Ensure operation is undertaken outdoors [E69]. <b>Clear up spills immediately and dispose of waste safely</b> [E19].</p> <p><i>Laboratory activities [CS36]:</i> Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour) [E40]. <b>Provide extract ventilation to points where emissions occur</b> [E54].</p> <p><i>Hand application - fingerpaints, pastels, adhesives [CS72]. Indoor [OC8]:</i> Ensure doors and windows are opened [E72].</p> <p><i>Hand application - fingerpaints, pastels, adhesives [CS72]. Outdoor [OC9]:</i> Ensure operation is undertaken outdoors [E69].</p>	



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Technical conditions and measures to control dispersion from source towards the worker	
Ventilation	Local exhaust ventilation is required for: - PROCs 4, 5, 8a, 8b, 10, 11, and 13
Efficiency rate	90% (PROC8b) and 80% (all others)
Organisational measures to prevent /limit releases, dispersion and exposure	
<ul style="list-style-type: none"><li>- Provide a good standard of general ventilation. Natural ventilation is from windows and doors etc. Controlled ventilation means air is supplied or removed by a powered fan [E1]</li><li>- Avoid manual contact with wet work pieces [EI17]</li><li>- Avoid splashing [C&amp;H15]</li><li>- Assumes a good basic standard of occupational hygiene is implemented [G1]</li></ul>	
Conditions and measures related to personal protection, hygiene and health evaluation	
PPE to prevent dermal exposure	<ul style="list-style-type: none"><li>- Wear suitable gloves tested to EN374 [PPE15] for activities, where direct contact with substance is possible;</li><li>- Wear suitable coveralls to prevent exposure to the skin [PPE27] for activities, where direct contact with substance is possible</li></ul> For hand application (PROC19): Wear chemically resistant gloves (tested to type EN374) in combination with specific activity training [PPE17]
PPE to prevent eye exposure	- Use suitable eye protection [PPE26], where direct contact (e.g. splashes) with substance is possible
Respiratory protection	For roller application or brushing (PROC10, outdoors) and manual spraying (PROC11, outdoors), when LEV is not feasible: Wear a respirator conforming to EN140 with Type A filter or better [PPE22] For all other activities: Not required
Respiratory PPE efficacy	90%
Additional good practice advice (for environment) beyond the REACH CSA	
None	

## 6. Exposure Scenario for Dilution of a concentrate to prepare end use mixture (professional) (ES 6)

Exposure Scenario 6: Dilution of a concentrate to prepare end use mixture (professional)
Professional use: SU 22
Environmental exposure scenario: ERC 8d
Workers scenario; PROC 5, 8a, 8b
Dilution of a concentrate to prepare various end use mixtures at dedicated and non-dedicated facilities, wide dispersive use, concentration in end use mixture < 1%
Environmental exposure



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ERC8d (outdoor use); outdoor use was chosen since many of these concentrates will be used outdoors and to cover maximum environmental release; this also covers indoor use (ERC 8a)	
Dilution of a concentrate to prepare various end use mixtures at dedicated and non-dedicated facilities, wide dispersive use, concentration in end use mixture < 1%	
<b>Product characteristics</b>	
Physical state	Liquid
Vapour pressure of substance	< 100 Pa at 20°C
Concentration of substance in mixture	Covers percentage substance in the product up to 25 % [G12]
<b>Amounts used</b>	
Annual amount (total for EU)	50 t/a
Daily amount (M <sub>use</sub> )	0.274 kg/d (calculated by ECETOC TRA)
M <sub>safe</sub>	1.77 kg/d (calculated by ECETOC TRA)
<b>Frequency and duration of use</b>	
Continuous use/release	
<b>Environment factors not influenced by risk management</b>	
Flow rate of receiving surface water	18.000 m <sup>3</sup> /day (ECETOC TRA default)
<b>Other given operational conditions affecting environmental exposure</b>	
Processing setting (indoor/outdoor)	Indoor and outdoor use
Processing temperature and pressure	Ambient temperature and pressure
<b>Technical conditions and measures at process level (source) to prevent release</b>	
None	
<b>Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil</b>	
Industrial sewage treatment plant	No
<b>Organizational measures to prevent/limit release from site</b>	
None	
<b>Conditions and measures related to municipal sewage treatment plant</b>	
Municipal sewage treatment plant	yes
STP discharge rate	2 x 10 <sup>3</sup> m <sup>3</sup> /day (ECETOC TRA default)
Efficacy (substance removal in STP)	88% (calculated by ECETOC TRA)
Sludge treatment technique	disposal or recovery
<b>Conditions and measures related to external treatment of waste for disposal</b>	
Dispose of waste solvent or used containers according to local regulations [ENVT12]	
<b>Conditions and measures related to external recovery of waste</b>	
None	
<b>Additional good practice advice (for environment) beyond the REACH CSA</b>	
None	
<b>Worker exposure</b>	
Based on PROC 5, 8a, 8b: Mixing or blending in batch processes for formulation of mixtures; Transfer of substance or preparation from and to vessels/large containers at dedicated and non-dedicated facilities	
<b>Product characteristics</b>	
Physical state	Liquid
Vapour pressure of substance	< 100 Pa at 20°C



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## SAFETY DATA SHEET-extended

Prepared in accordance with Annex II of REACH Regulation (EC) 1907/2006, Regulation (EC) 1272/2008 and regulation (EC) 453/2010

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Concentration of substance in mixture	Covers percentage substance in the product up to 25 % <b>[G12]</b> If clean-down and maintenance of equipment and disposal of wastes (PROC8a) have to be carried out for 1-4 hours daily and local exhaust ventilation cannot be provided, use only concentrates with up to 5%
<b>Amounts used</b>	
Not relevant for ECETOC TRA exposure estimates	
<b>Frequency and duration of use/exposure</b>	
Frequency and duration	PROC8a: Avoid carrying out operation for more than 1 hour <b>[OC11]</b> PROC 5 and 8b: Avoid carrying out operation for more than 4 hours <b>[OC12]</b>
<b>Human factors not influenced by risk management</b>	
Potentially exposed body parts	Hands and forearms
Exposed skin surface	The extent of hand exposure (one hand or both hands, one side or both sides) differs between different PROCs; exposure of forearms is only assumed in non-industrial spraying activities (PROC11), the following range of values is assumed in ECETOC TRA: 480 cm <sup>2</sup> (e.g. PROC5) – 960 cm <sup>2</sup> (PROC8a)
<b>Other given operational conditions affecting workers exposure</b>	
Setting (indoor/outdoor)	Indoor and outdoor use
Room size	Not relevant for ECETOC TRA exposure estimates
Processing temperature and pressure	Assumes use at not more than 20 °C above ambient temperature <b>[G15]</b>
<b>Technical conditions and measures at process level (source) to prevent release</b>	
<ul style="list-style-type: none"> <li>- <i>Transfer from/pouring from containers (PROC8b):</i> Carefully pour from containers <b>E62</b></li> <li>- <i>Clean-down and maintenance of equipment and disposal of wastes (PROC8a):</i> Drain down system prior to equipment break-in or maintenance <b>E65</b>. Retain drain downs in sealed storage pending disposal or for subsequent recycle. <b>ENVT4</b></li> </ul>	
<b>Technical conditions and measures to control dispersion from source towards the worker</b>	
Ventilation	Local exhaust ventilation is generally not required. If PROC8a activities have to be carried out for 1-4 hours daily, provide local exhaust ventilation
Efficiency rate	80%
<b>Organisational measures to prevent /limit releases, dispersion and exposure</b>	
<ul style="list-style-type: none"> <li>- Provide a good standard of general ventilation. Natural ventilation is from windows and doors etc. Controlled ventilation means air is supplied or removed by a powered fan <b>[E1]</b></li> <li>- Avoid manual contact with wet work pieces <b>[EI17]</b></li> <li>- Avoid splashing <b>[C&amp;H15]</b></li> <li>- Assumes a good basic standard of occupational hygiene is implemented <b>[G1]</b></li> </ul>	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	



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## SAFETY DATA SHEET-extended

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PPE to prevent dermal exposure	- Wear suitable gloves tested to EN374 [PPE15] for activities, where direct contact with substance is possible - Wear suitable coveralls to prevent exposure to the skin [PPE27] for activities, where direct contact with substance is possible
PPE to prevent eye exposure	- Use suitable eye protection [PPE26], where direct contact (e.g. splashes) with substance is possible
Respiratory protection	Not required
Respiratory PPE efficacy	N/A
<b>Additional good practice advice (for environment) beyond the REACH CSA</b>	
None	

## 7. Exposure Scenario for Dilution of a concentrate to prepare end use mixture (consumers) (ES 7)

<b>Exposure Scenario 7: Dilution of a concentrate to prepare end use mixture (consumers)</b>	
Consumer use: SU21	
Environmental exposure scenario: ERC 8d	
Product category: covers many different products with the dilution of the concentrate being more important than the final product category	
Dilution of a concentrate to prepare various end use mixtures at dedicated and non-dedicated facilities, wide dispersive use, concentration in end use mixture < 1%	
<b>Environmental exposure</b>	
ERC8d (outdoor use); outdoor use was chosen since many of these concentrates will be used outdoors and to cover maximum environmental release; this also covers indoor use (ERC 8a)	
Covers uses as described above	
<b>Product characteristics</b>	
Physical state	Liquid
Vapour pressure of substance	< 100 Pa at 20°C
Concentration of substance in mixture	Covers percentage substance in the product up to 25% [G12]
<b>Amounts used</b>	
Annual amount (total for EU)	10 t/a
Daily amount (M <sub>use</sub> )	0.0548 kg/d (calculated by ECETOC TRA)
M <sub>safe</sub>	0.69 kg/d (calculated by ECETOC TRA)



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<b>Frequency and duration of use</b>	
Continuous use/release	
<b>Environment factors not influenced by risk management</b>	
Flow rate of receiving surface water	18.000 m <sup>3</sup> /day (ECETOC TRA default)
<b>Other given operational conditions affecting environmental exposure</b>	
Processing setting (indoor/outdoor)	Indoor and outdoor use
Processing temperature and pressure	Ambient temperature and pressure
<b>Conditions and measures related to municipal sewage treatment plant</b>	
Municipal sewage treatment plant	yes
STP discharge rate	2 x 10 <sup>3</sup> m <sup>3</sup> /day (ECETOC TRA default)
Efficacy (substance removal in STP)	88% (calculated by ECETOC TRA)
Sludge treatment technique	disposal or recovery
<b>Conditions and measures related to external treatment of waste for disposal</b>	
Dispose of waste solvent or used containers according to local regulations [ENVT12]	
<b>Conditions and measures related to external recovery of waste</b>	
None	
<b>Additional good practice advice (for environment) beyond the REACH CSA</b>	
None	
<b>Consumer exposure</b>	
Based on default assumptions in ConsExpo (v. 4.1) for a similar task ("mixing and loading of liquids" for pest control products) and product-specific data on concentrations of the substance in concentrates	
<b>Product characteristic</b>	
Covers liquid concentrate mixtures (preparations) with concentrations of the substance of up to 25%, which are then diluted (concentration in the final product < 1%)	
<b>Amounts used</b>	
Covers mixtures (preparations) containing 25% of the substance in amounts of up to 1000 g per event (ConsExpo default amount of 500 g doubled to cover larger package sizes)	
<b>Frequency and duration of use/exposure</b>	
Covers the use (dilution event) up to 24 times per year (2 times per months; ConsExpo default multiplied with 4 to cover more frequent uses), each dilution event lasting 1.33 minutes (ConsExpo default)	
<b>Human factors not influenced by risk management</b>	
Potentially exposed body parts	Fingertips and hand (due to splashes and leakages)
Exposed skin surface	Not relevant for ConsExpo exposure estimates
<b>Other given operational conditions affecting consumers exposure</b>	
Setting (indoor/outdoor)	Indoor and outdoor use
Room size	1 m <sup>3</sup> (ConsExpo default as a surrogate for the "personal volume" around the user)
Processing temperature and pressure	Assumes activities are at ambient temperature (unless stated differently) [G17]
<b>Conditions and measures related to information and behavioural advice to consumers</b>	
For consumer products containing concentrations >10% give the following advice to end users:	
- Provide a good standard of general ventilation. Natural ventilation is from windows and doors etc. Controlled ventilation means air is supplied or removed by a powered fan. [E1]	
- Avoid manual contact with wet work pieces [EI17]	
- Use suitable eye protection and gloves [PPE14]	
Alternative to recommendation of personal protection equipment: design product in a way that skin and eye	



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Prepared in accordance with Annex II of REACH Regulation (EC) 1907/2006, Regulation (EC) 1272/2008 and regulation (EC) 453/2010

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contact is impossible
<b>Conditions and measures related to personal protection and hygiene</b>
None
<b>Additional good practice advice (for environment) beyond the REACH CSA</b>
None

## 8. Exposure Scenario for Use in laboratories (industrial) (ES 8)

<b>Exposure Scenario 8: Use in laboratories (industrial)</b>	
Industrial use: SU 3	
Environmental exposure scenario: ESVOC 38, spERC 4.24.v1 (specifies ERC 2, 4)	
Workers scenario ESVOC GES 17 (industrial); PROC 10, 15	
Use in laboratory settings	
<b>Environmental exposure</b>	
Based on ESVOC spERC: ESVOC 38 (ECETOC TRA) = spERC 4.24.v1	
Use of the substance within laboratory setting, including pilot plants	
<b>Product characteristics</b>	
Physical state	Liquid
Vapour pressure of substance	< 100 Pa at 20°C
Concentration of substance	Covers percentage substance in the product up to 100% (unless stated differently) [G13]
<b>Amounts used</b>	
Annual amount (per site for industrial use)	5 t/a
Daily amount (per site for industrial use) (M <sub>use</sub> )	100 kg/d (calculated by ECETOC TRA)
M <sub>safe</sub>	133 kg/d (calculated by ECETOC TRA)
<b>Frequency and duration of use</b>	
Covers use on 20 d/year	
<b>Environment factors not influenced by risk management</b>	
Flow rate of receiving surface water	18.000 m <sup>3</sup> /day (ECETOC TRA default)
<b>Other given operational conditions affecting environmental exposure</b>	
Processing setting (indoor/outdoor)	Indoor use
Processing temperature and pressure	Assumes use at not more than 20°C above ambient temperature [G15]
<b>Technical conditions and measures at process level (source) to prevent release</b>	
None	
<b>Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil</b>	
Industrial sewage treatment plant	No
<b>Organizational measures to prevent/limit release from site</b>	
None	
<b>Conditions and measures related to municipal sewage treatment plant</b>	
Municipal sewage treatment plant	yes
STP discharge rate	2 x 10 <sup>3</sup> m <sup>3</sup> /day (ECETOC TRA default)
Efficacy (substance removal in STP)	88% (calculated by ECETOC TRA)



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Sludge treatment technique	disposal or recovery
<b>Conditions and measures related to external treatment of waste for disposal</b>	
Dispose of waste solvent or used containers according to local regulations [ENVT12]	
<b>Conditions and measures related to external recovery of waste</b>	
None	
<b>Additional good practice advice (for environment) beyond the REACH CSA</b>	
None	
<b>Worker exposure</b>	
Based on ESVOC GES 17: Use as solvent in laboratories handled in small quantities (typically less than 1 litre), low volatility solvent with DNEL inhalation $\geq 10$ ppm, DNEL dermal $\geq 5$ mg/kg/d	
<b>Product characteristics</b>	
Physical state	Liquid
Vapour pressure of substance	< 100 Pa at 20°C
Concentration of substance	Covers percentage substance in the product up to 100% (unless stated differently) [G13]
<b>Amounts used</b>	
Not relevant for ECETOC TRA exposure estimates	
<b>Frequency and duration of use/exposure</b>	
Frequency and duration	Covers daily exposures up to 8 hours (unless stated differently) [G2]  For cleaning (wiping, brushing, flushing, PROC10) activities: Avoid carrying out operation for more than 1 hour [OC11]
<b>Human factors not influenced by risk management</b>	
Potentially exposed body parts	Hands and forearms
Exposed skin surface	The extent of hand exposure (one hand or both hands, one side or both sides) differs between different PROCs; the following values are assumed in ECETOC TRA: 240 cm <sup>2</sup> (PROC15) and 960 cm <sup>2</sup> (PROC10)
<b>Other given operational conditions affecting workers exposure</b>	
Setting (indoor/outdoor)	Indoor use
Room size	Not relevant for ECETOC TRA exposure estimates
Processing temperature and pressure	Assumes use at not more than 20°C above ambient temperature [G15]
<b>Technical conditions and measures at process level (source) to prevent release</b>	
<ul style="list-style-type: none"> <li>- General risk management measures applicable to all activities (CS_new): Provide a good standard of general or controlled ventilation (5 to 10 air changes per hour) (E40); E74 - Ensure ventilation system is regularly maintained and tested; E62 - Carefully pour from containers E50 - Put lids (caps) on containers (bottles) immediately after use</li> <li>- CS36 Laboratory activities: E118 – No specific measures identified; E66 - Ensure materials transfers are under containment or extract ventilation;</li> </ul>	



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- **CS47** Cleaning [wiping, brushing, flushing]: **E66** - Ensure materials transfers are under containment or extract ventilation; **Use fume cupboard (BDI 03.03.01.01.01-12000)**
- **CS47** Cleaning [wiping, brushing, flushing]: Avoid carrying out operation for more than 4 hours (**OC12**); **E66** - **Ensure materials transfers are under containment or extract ventilation**

#### Technical conditions and measures to control dispersion from source towards the worker

Ventilation	Local exhaust ventilation is not required
Efficiency rate	N/A

#### Organisational measures to prevent /limit releases, dispersion and exposure

- Provide a good standard of general ventilation. Natural ventilation is from windows and doors etc. Controlled ventilation means air is supplied or removed by a powered fan **[E1]**
- Avoid manual contact with wet work pieces **[EI17]**
- Avoid splashing **[C&H15]**
- Assumes a good basic standard of occupational hygiene is implemented **[G1]**

#### Conditions and measures related to personal protection, hygiene and health evaluation

PPE to prevent dermal exposure	<ul style="list-style-type: none"> <li>- Wear suitable gloves tested to EN374 <b>[PPE15]</b> for activities, where direct contact with substance is possible</li> <li>- Wear suitable coveralls to prevent exposure to the skin <b>[PPE27]</b> for activities, where direct contact with substance is possible</li> </ul>
PPE to prevent eye exposure	- Use suitable eye protection <b>[PPE26]</b> , where direct contact (e.g. splashes) with substance is possible
Respiratory protection	Not required
Respiratory PPE efficacy	N/A

#### Additional good practice advice (for environment) beyond the REACH CSA

None

## 9. Exposure Scenario for Use in functional fluids (industrial) (ES 9)

Exposure Scenario 9: Use in functional fluids (industrial)	
Industrial use: SU 3	
Environmental exposure scenario: ESVOC 31, spERC 7.13a.v1 (specifies ERC 7)	
Workers scenario ESVOC GES 13 (industrial); PROC 1, 2, 3, 4, 8a, 8b, 9, 20	
Use as functional fluids e.g. cable oils, transfer oils, coolants, insulators, refrigerants, hydraulic fluids in industrial equipment including maintenance and related material transfers	
Environmental exposure	
Based on ESVOC spERC: ESVOC 31 (ECETOC TRA) = spERC 7.13a.v1	
Use as functional fluids e.g. cable oils, transfer oils, insulators, hydraulic fluids in industrial equipment including maintenance and related material transfers	
Product characteristics	
Physical state	Liquid
Vapour pressure of substance	< 100 Pa at 20°C
Concentration of substance in mixture	Covers percentage substance in the product up to



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	25% [G12]
<b>Amounts used</b>	
Annual amount (per site for industrial use)	100 t/a
Daily amount (per site for industrial use) (M <sub>use</sub> )	500 kg/d (calculated by ECETOC TRA)
M <sub>safe</sub>	4480 kg/d (calculated by ECETOC TRA)
<b>Frequency and duration of use</b>	
Release on 20 d/year	
<b>Environment factors not influenced by risk management</b>	
Flow rate of receiving surface water	18.000 m <sup>3</sup> /day (ECETOC TRA default)
<b>Other given operational conditions affecting environmental exposure</b>	
Processing setting (indoor/outdoor)	Indoor and outdoor use
Processing temperature and pressure	Ambient temperature and pressure
<b>Technical conditions and measures at process level (source) to prevent release</b>	
None	
<b>Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil</b>	
Industrial sewage treatment plant	No
<b>Organizational measures to prevent/limit release from site</b>	
None	
<b>Conditions and measures related to municipal sewage treatment plant</b>	
Municipal sewage treatment plant	yes
STP discharge rate	2 x 10 <sup>3</sup> m <sup>3</sup> /day (ECETOC TRA default)
Efficacy (substance removal in STP)	88% (calculated by ECETOC TRA)
Sludge treatment technique	disposal or recovery
<b>Conditions and measures related to external treatment of waste for disposal</b>	
Dispose of waste solvent or used containers according to local regulations [ENV12]	
<b>Conditions and measures related to external recovery of waste</b>	
None	
<b>Additional good practice advice (for environment) beyond the REACH CSA</b>	
None	
<b>Worker exposure</b>	
Based on ESVOC GES 13: Use as functional fluid (industrial application), low volatility solvent with DNEL inhalation ≥ 10 ppm, DNEL dermal ≥ 5 mg/kg/d	
<b>Product characteristics</b>	
Physical state	Liquid
Vapour pressure of substance	< 100 Pa at 20°C
Concentration of substance in mixture	Covers percentage substance in the product up to 25% [G12]
<b>Amounts used</b>	
Not relevant for ECETOC TRA exposure estimates	
<b>Frequency and duration of use/exposure</b>	
Frequency and duration	PROC 8a: Avoid carrying out operation for more than 4 hours [OC12] All other PROCs: Covers daily exposures up to 8 hours (unless



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	stated differently) [G2]
<b>Human factors not influenced by risk management</b>	
Potentially exposed body parts	Hands and forearms
Exposed skin surface	The extent of hand exposure (one hand or both hands, one side or both sides) differs between different PROCs; exposure of forearms is only assumed in industrial spraying activities (PROC7), the following range of values is assumed in ECETOC TRA: 240 cm <sup>2</sup> (e.g. PROC1) – 960 cm <sup>2</sup> (PROC8a)
<b>Other given operational conditions affecting workers exposure</b>	
Setting (indoor/outdoor)	Indoor and outdoor use
Room size	Not relevant for ECETOC TRA exposure estimates
Processing temperature and pressure	Assumes use at not more than 20°C above ambient temperature [G15] If applicable for PROC4 (see below): Operation is carried out at elevated temperature (> 20°C above ambient temperature) [OC7]
<b>Technical conditions and measures at process level (source) to prevent release</b>	
<ul style="list-style-type: none"> <li>- <i>Bulk transfers</i> CS14: Transfer via enclosed lines. E52 Clear lines prior to decoupling E39.</li> <li>- <i>Drum/batch transfers</i> CS8: Use drum pumps or carefully pour from container. E64 Avoid spillage when withdrawing pump. C&amp;H16</li> <li>- <i>Filling / preparation of equipment from drums or containers</i> CS45 Use drum pumps or carefully pour from container E64</li> <li>- <i>Equipment operation (closed systems)</i> CS15: No specific measures identified EI18</li> <li>- <i>Equipment operation (open systems)</i> CS16: Minimise exposure by enclosing the operation or equipment and provide extract ventilation at openings if operation carried out at elevated temperatures E75</li> <li>- <i>Equipment maintenance</i> CS5: Drain down system prior to equipment break-in or maintenance E65. Transfer via enclosed lines E52. Retain drain downs in sealed storage pending disposal or for subsequent recycle. ENVT4</li> <li>- <i>Re-work and re-manufacture of articles</i> CS19: Drain down system prior to equipment break-in or maintenance E65 Retain drainings in sealed storage pending disposal. ENVT4</li> <li>- <i>Equipment maintenance</i> CS5: Drain down system prior to equipment break-in or maintenance E65 . Retain drain downs in sealed storage pending disposal or for subsequent recycle. ENVT4</li> <li>- <i>Material storage</i> CS67: Store substance within a closed system. E84 Ensure dedicated transfer points are provided. E66</li> </ul>	
<b>Technical conditions and measures to control dispersion from source towards the worker</b>	
Ventilation	Local exhaust ventilation is required for: PROC4 when used at elevated temperatures of up to 80°C
Efficiency rate	90%
<b>Organisational measures to prevent /limit releases, dispersion and exposure</b>	
<ul style="list-style-type: none"> <li>- Provide a good standard of general ventilation. Natural ventilation is from windows and doors etc. Controlled ventilation means air is supplied or removed by a powered fan [E1]</li> </ul>	



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<ul style="list-style-type: none"> <li>- Avoid manual contact with wet work pieces [E17]</li> <li>- Avoid splashing [C&amp;H15]</li> <li>- Assumes a good basic standard of occupational hygiene is implemented [G1]</li> </ul>	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
PPE to prevent dermal exposure	<ul style="list-style-type: none"> <li>- Wear suitable gloves tested to EN374 [PPE15] for activities, where direct contact with substance is possible</li> <li>- Wear suitable coveralls to prevent exposure to the skin [PPE27] for activities, where direct contact with substance is possible</li> </ul>
PPE to prevent eye exposure	- Use suitable eye protection [PPE26], where direct contact (e.g. splashes) with substance is possible
Respiratory protection	Not required
Respiratory PPE efficacy	N/A
<b>Additional good practice advice (for environment) beyond the REACH CSA</b>	
None	

## 10. Exposure Scenario for Use in functional fluids (professional) (ES 10)

<b>Exposure Scenario 9: Use in functional fluids (professional)</b>	
Professional use: SU 22	
Environmental exposure scenario: ESVOC 32, spERC 9.13b.v1 (specifies ERC 9a,b)	
Workers scenario ESVOC GES 13 (industrial); PROC 1, 2, 3, 8a, 9, 20	
Use as functional fluids e.g. cable oils, transfer oils, coolants, insulators, refrigerants, hydraulic fluids in industrial equipment including maintenance and related material transfers	
<b>Environmental exposure</b>	
Based on ESVOC spERC: ESVOC 32 (ECETOC TRA) = spERC 9.13b.v1	
Use as functional fluids e.g. cable oils, transfer oils, insulators, hydraulic fluids in industrial equipment including maintenance and related material transfers	
<b>Product characteristics</b>	
Physical state	Liquid
Vapour pressure of substance	< 100 Pa at 20°C
Concentration of substance in mixture	Covers percentage substance in the product up to 25% [G12]
<b>Amounts used</b>	
Annual amount (total for EU)	10 t/a
Daily amount (per site for industrial use) (M <sub>use</sub> )	0.014 kg/d (calculated by ECETOC TRA)
M <sub>safe</sub>	0.227 kg/d (calculated by ECETOC TRA)
<b>Frequency and duration of use</b>	
Continuous use/release	
<b>Environment factors not influenced by risk management</b>	
Flow rate of receiving surface water	18.000 m <sup>3</sup> /day (ECETOC TRA default)
<b>Other given operational conditions affecting environmental exposure</b>	



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Processing setting (indoor/outdoor)	Indoor and outdoor use
Processing temperature and pressure	Ambient temperature and pressure
<b>Technical conditions and measures at process level (source) to prevent release</b>	
None	
<b>Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil</b>	
Industrial sewage treatment plant	No
<b>Organizational measures to prevent/limit release from site</b>	
None	
<b>Conditions and measures related to municipal sewage treatment plant</b>	
Municipal sewage treatment plant	yes
STP discharge rate	2 x 10 <sup>3</sup> m <sup>3</sup> /day (ECETOC TRA default)
Efficacy (substance removal in STP)	88% (calculated by ECETOC TRA)
Sludge treatment technique	disposal or recovery
<b>Conditions and measures related to external treatment of waste for disposal</b>	
Dispose of waste solvent or used containers according to local regulations [ENVT12]	
<b>Conditions and measures related to external recovery of waste</b>	
None	
<b>Additional good practice advice (for environment) beyond the REACH CSA</b>	
None	
<b>Worker exposure</b>	
Based on ESVOC GES 13: Use as functional fluid (professional application), low volatility solvent with DNEL inhalation ≥ 10 ppm, DNEL dermal ≥ 5 mg/kg/d	
<b>Product characteristics</b>	
Physical state	Liquid
Vapour pressure of substance	< 100 Pa at 20°C
Concentration of substance in mixture	Covers percentage substance in the product up to 25% [G12]
<b>Amounts used</b>	
Not relevant for ECETOC TRA exposure estimates	
<b>Frequency and duration of use/exposure</b>	
Frequency and duration	Covers daily exposures up to 8 hours (unless stated differently) [G2] PROC 8a: Avoid carrying out operation for more than 1 hour [OC11]
<b>Human factors not influenced by risk management</b>	
Potentially exposed body parts	Hands and forearms
Exposed skin surface	The extent of hand exposure (one hand or both hands, one side or both sides) differs between different PROCs; exposure of forearms is only assumed in industrial spraying activities (PROC7), the following range of values is assumed in ECETOC TRA:



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## SAFETY DATA SHEET-extended

Prepared in accordance with Annex II of REACH Regulation (EC) 1907/2006, Regulation (EC) 1272/2008 and regulation (EC) 453/2010

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	240 cm <sup>2</sup> (e.g. PROC1) – 960 cm <sup>2</sup> (PROC8a)
<b>Other given operational conditions affecting workers exposure</b>	
Setting (indoor/outdoor)	Indoor and outdoor use
Room size	Not relevant for ECETOC TRA exposure estimates
Processing temperature and pressure	Assumes use at not more than 20°C above ambient temperature [G15] If applicable for PROC20 (see below): Operation is carried out at elevated temperature (> 20°C above ambient temperature) [OC7]
<b>Technical conditions and measures at process level (source) to prevent release</b>	
<ul style="list-style-type: none"> <li>- <i>Drum/batch transfers</i> CS8: Use drum pumps or carefully pour from container. E64 Avoid spillage when withdrawing pump. C&amp;H16</li> <li>- <i>Transfer from/pouring from containers</i> CS22: Use drum pumps or carefully pour from container. E64 Clear up spills immediately and dispose of waste safely. EI9</li> <li>- <i>Filling / preparation of equipment from drums or containers.</i> CS45 Carefully pour from containers E62</li> <li>- <i>Equipment operation (closed systems)</i> CS15 Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings E60 No other specific measures identified EI21</li> <li>- <i>Re-work and re-manufacture of articles</i> CS19 Provide enhanced general ventilation by mechanical means E48 Retain drain downs in sealed storage pending disposal or for subsequent recycle ENVT4</li> <li>- <i>Equipment maintenance</i> CS5: Drain down system prior to equipment break-in or maintenance E65. Retain drain downs in sealed storage pending disposal or for subsequent recycle ENVT4</li> <li>- <i>Storage</i> CS55: Store substance within a closed system. E47 Ensure dedicated transfer points are provided. E66</li> </ul>	
<b>Technical conditions and measures to control dispersion from source towards the worker</b>	
Ventilation	Local exhaust ventilation is required for: - PROC20 when used at elevated temperatures up to 80°C
Efficiency rate	80%
<b>Organisational measures to prevent /limit releases, dispersion and exposure</b>	
<ul style="list-style-type: none"> <li>- Provide a good standard of general ventilation. Natural ventilation is from windows and doors etc. Controlled ventilation means air is supplied or removed by a powered fan [E1]</li> <li>- Avoid manual contact with wet work pieces [EI17]</li> <li>- Avoid splashing [C&amp;H15]</li> <li>- Assumes a good basic standard of occupational hygiene is implemented [G1]</li> </ul>	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
PPE to prevent dermal exposure	<ul style="list-style-type: none"> <li>- Wear suitable gloves tested to EN374 [PPE15] for activities, where direct contact with substance is possible</li> <li>- Wear suitable coveralls to prevent exposure to the skin [PPE27] for activities, where direct contact with substance is possible</li> </ul>
PPE to prevent eye exposure	<ul style="list-style-type: none"> <li>- Use suitable eye protection [PPE26], where direct contact (e.g. splashes) with substance is possible</li> </ul>



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Respiratory protection	Not required
Respiratory PPE efficacy	N/A
<b>Additional good practice advice (for environment) beyond the REACH CSA</b>	
None	

## 11. Exposure Scenario for Use in cleaning products (professional) (ES 11)

<b>Exposure Scenario 11: Use in cleaning products (professional)</b>	
Professional use: SU 22	
Environmental exposure scenario: ESVOC 9, spERC 8.4b.v1 (specifies ERC 8a,d)	
Workers scenario: ESVOC GES 4 (professional); PROC 2, 3, 4, 8a, 8b, 10, 11, 13	
Covers the professional use as a component of cleaning products including pouring/unloading from drums or containers	
<b>Environmental exposure</b>	
Based on ESVOC spERC: ESVOC 9 (ECETOC TRA) = spERC 8.4b.v1	
Covers the use as a component of cleaning products for professional use including pouring/unloading from drums or containers; and exposures during cleaning activities	
<b>Product characteristics</b>	
Physical state	Liquid
Vapour pressure of substance	< 100 Pa at 20°C
Concentration of substance in mixture	Covers percentage substance in the product up to 25% [G12]
<b>Amounts used</b>	
Annual amount (total for EU)	100 t/a
Daily amount (M <sub>use</sub> )	0.137 kg/d (calculated by ECETOC TRA)
M <sub>safe</sub>	2.27 kg/d (calculated by ECETOC TRA)
<b>Frequency and duration of use</b>	
Continuous use/release	
<b>Environment factors not influenced by risk management</b>	
Flow rate of receiving surface water	18.000 m <sup>3</sup> /day (ECETOC TRA default)
<b>Other given operational conditions affecting environmental exposure</b>	
Processing setting (indoor/outdoor)	Indoor and outdoor use
Processing temperature and pressure	Ambient temperature and pressure
<b>Technical conditions and measures at process level (source) to prevent release</b>	
None	
<b>Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil</b>	
Industrial sewage treatment plant	No
<b>Organizational measures to prevent/limit release from site</b>	
None	
<b>Conditions and measures related to municipal sewage treatment plant</b>	
Municipal sewage treatment plant	yes
STP discharge rate	2 x 10 <sup>3</sup> m <sup>3</sup> /day (ECETOC TRA default)



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Efficacy (substance removal in STP)	88% (calculated by ECETOC TRA)
Sludge treatment technique	disposal or recovery
<b>Conditions and measures related to external treatment of waste for disposal</b>	
Dispose of waste solvent or used containers according to local regulations [ENVT12]	
<b>Conditions and measures related to external recovery of waste</b>	
None	
<b>Additional good practice advice (for environment) beyond the REACH CSA</b>	
None	
<b>Worker exposure</b>	
Based on ESVOG GES 4: Cleaning (professional application), low volatility solvent with DNEL inhalation $\geq$ 10 ppm, DNEL dermal $\geq$ 5 mg/kg/d	
<b>Product characteristics</b>	
Physical state	Liquid
Vapour pressure of substance	< 100 Pa at 20°C
Concentration of substance in mixture	Covers percentage substance in the product up to 25% [G12]
<b>Amounts used</b>	
Not relevant for ECETOC TRA exposure estimates	
<b>Frequency and duration of use/exposure</b>	
Frequency and duration	Covers daily exposures up to 8 hours (unless stated differently) [G2] PROC8a: Avoid carrying out operation for more than 1 hour [OC11] PROC8b, 10 and 11: Avoid carrying out operation for more than 4 hours [OC12]
<b>Human factors not influenced by risk management</b>	
Potentially exposed body parts	Hands and forearms
Exposed skin surface	The extent of hand exposure (one hand or both hands, one side or both sides) differs between different PROCs; exposure of forearms is only assumed in non-industrial spraying activities (PROC11), the following range of values is assumed in ECETOC TRA: 240 cm <sup>2</sup> (e.g. PROC3) – 1500 cm <sup>2</sup> (PROC11)
<b>Other given operational conditions affecting workers exposure</b>	
Setting (indoor/outdoor)	Indoor and outdoor use
Room size	Not relevant for ECETOC TRA exposure estimates
Processing temperature and pressure	Assumes use at not more than 20°C above ambient temperature [G15]
<b>Technical conditions and measures at process level (source) to prevent release</b>	
Automated process with (semi) closed systems. [CS93]. Use in contained systems [CS38]. No specific measures identified [EI18].	
Automated process with (semi) closed systems. [CS93]. Drum/batch transfers [CS8]. Use in contained systems	



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[CS38]. No specific measures identified [EI18].  
 Filling / preparation of equipment from drums or containers. [CS45]. Ensure operation is undertaken outdoors [E69].  
 Cleaning with low-pressure washers [CS42]. Rolling, Brushing [CS51]. No spraying [CS60]. Limit the substance content in the product to 5 % [OC17]. Cleaning with high pressure washers [CS44]. Spraying [CS10]. Indoor [OC8]. Limit the substance content in the product to 1 % [OC16].  
 Manual [CS34]. Surfaces [CS48]. Cleaning [CS47]. Spraying [CS10]. Avoid carrying out operation for more than 4 hours [OC12]. Limit the substance content in the product to 25 % [OC24].  
 Ensure doors and windows are opened [E72].  
 Ad hoc manual application via trigger sprays, dipping, etc. [CS27]. Rolling, Brushing [CS51]. Provide extract ventilation to points where emissions occur [E54].  
 Cleaning of medical devices [CS74]. Provide extract ventilation to points where emissions occur [E54].

#### Technical conditions and measures to control dispersion from source towards the worker

Ventilation	Local exhaust ventilation is generally not envisaged. For roller application or brushing (PROC 10): use LEV (if not feasible, use either products containing up to 5% of the substance or durations < 1 h For non-industrial spraying (PROC 11): use LEV together with either products containing up to 5% of the substance or durations < 1 h
Efficiency rate	80%

#### Organisational measures to prevent /limit releases, dispersion and exposure

- Provide a good standard of general ventilation. Natural ventilation is from windows and doors etc. Controlled ventilation means air is supplied or removed by a powered fan [E1]
- Avoid manual contact with wet work pieces [EI17]
- Avoid splashing [C&H15]
- Assumes a good basic standard of occupational hygiene is implemented [G1]

#### Conditions and measures related to personal protection, hygiene and health evaluation

PPE to prevent dermal exposure	- Wear suitable gloves tested to EN374 [PPE15] for activities, where direct contact with substance is possible - Wear suitable coveralls to prevent exposure to the skin [PPE27] for activities, where direct contact with substance is possible PROC 11: Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training [PPE16]
PPE to prevent eye exposure	- Use suitable eye protection [PPE26], where direct contact (e.g. splashes) with substance is possible
Respiratory protection	PROC 11: Wear a half mask respirator conforming to EN140, 149 or equivalent [PPE22] (if the technical conditions and measures mentioned above are not feasible) PROC8a (if carried out for more than 1 hour):



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	Wear a half mask respirator conforming to EN140, 149 or equivalent [PPE22]
Respiratory PPE efficacy	90%
<b>Additional good practice advice (for environment) beyond the REACH CSA</b>	
None	

## 12. Exposure Scenario for Use in oil and gas field drilling (industrial) (ES 12)

<b>Exposure Scenario 12: Use in oil and gas field drilling (industrial)</b>	
Industrial use: SU 3 (2a, 2b)	
Environmental exposure scenario: ESVOC 11, spERC 4.5a.v1 (specifies ERC 4)	
Workers scenario: ESVOC GES 5 (industrial); PROC 1, 2, 3, 4, 8a, 8b	
Oil field well drilling and production operations (including drilling muds and well cleaning) including material transfers, on-site formulation, well head operations, shaker room activities and related maintenance.	
<b>Environmental exposure</b>	
Based on ESVOC spERC: ESVOC 11 (ECETOC TRA) = spERC 4.5a.v1	
Oil field well drilling and production operations (including drilling muds and well cleaning) including material transfers, on-site formulation, well head operations, shaker room activities and related maintenance.	
<b>Product characteristics</b>	
Physical state	Liquid
Vapour pressure of substance	< 100 Pa at 20°C
Concentration of substance in mixture	Covers percentage substance in the product up to 100% (unless stated differently) [G13]
<b>Amounts used</b>	
Annual amount (per site for industrial use)	1 t/a
Daily amount (per site for industrial use) (M <sub>use</sub> )	33.3 kg/d (calculated by ECETOC TRA)
M <sub>safe</sub>	38.7 kg/d (calculated by ECETOC TRA)
<b>Frequency and duration of use</b>	
Release on 30 d/year	
<b>Environment factors not influenced by risk management</b>	
Flow rate of receiving surface water	18.000 m <sup>3</sup> /day (ECETOC TRA default)
<b>Other given operational conditions affecting environmental exposure</b>	
Processing setting (indoor/outdoor)	Indoor and outdoor use
Processing temperature and pressure	Ambient temperature and pressure
<b>Technical conditions and measures at process level (source) to prevent release</b>	
None	
<b>Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil</b>	
Industrial sewage treatment plant	No
<b>Organizational measures to prevent/limit release from site</b>	
None	
<b>Conditions and measures related to municipal sewage treatment plant</b>	
Municipal sewage treatment plant	yes
STP discharge rate	2 x 10 <sup>3</sup> m <sup>3</sup> /day (ECETOC TRA default)



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Efficacy (substance removal in STP)	88% (calculated by ECETOC TRA)
Sludge treatment technique	disposal or recovery
<b>Conditions and measures related to external treatment of waste for disposal</b>	
Dispose of waste solvent or used containers according to local regulations [ENVT12]	
<b>Conditions and measures related to external recovery of waste</b>	
None	
<b>Additional good practice advice (for environment) beyond the REACH CSA</b>	
None	
<b>Worker exposure</b>	
Based on ESVOC GES 5: Use in Oil field drilling and production operations (industrial application), low volatility solvent with DNEL inhalation $\geq 10$ ppm, DNEL dermal $\geq 5$ mg/kg/d	
<b>Product characteristics</b>	
Physical state	Liquid
Vapour pressure of substance	< 100 Pa at 20°C
Concentration of substance in mixture	Covers percentage substance in the product up to 100% (unless stated differently) [G13]
<b>Amounts used</b>	
Not relevant for ECETOC TRA exposure estimates	
<b>Frequency and duration of use/exposure</b>	
Frequency and duration	Covers daily exposures up to 8 hours (unless stated differently) [G2] PROC 8a: Avoid carrying out operation for more than 1 hour [OC11]
<b>Human factors not influenced by risk management</b>	
Potentially exposed body parts	Hands and forearms
Exposed skin surface	The extent of hand exposure (one hand or both hands, one side or both sides) differs between different PROCs; the following range of values is assumed in ECETOC TRA: 240 cm <sup>2</sup> (e.g. PROC1) – 960 cm <sup>2</sup> (PROC8a)
<b>Other given operational conditions affecting workers exposure</b>	
Setting (indoor/outdoor)	Indoor and outdoor use
Room size	Not relevant for ECETOC TRA exposure estimates
Processing temperature and pressure	Assumes use at not more than 20°C above ambient [G15] PROC4 (if applicable): Operation is carried out at elevated temperature (> 20°C above ambient temperature) [OC7]
<b>Technical conditions and measures at process level (source) to prevent release</b>	
Drilling mud (re-) formulation (PROC3): Handle substance within a predominantly closed system provided with extract ventilation (E49). Ensure the ventilation system is regularly maintained and tested (E74).	
Operation of solids filtering equipment - vapour exposures (PROC4): Aerosol generation due to elevated	



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process temperature (OC25). Receptor hood for fumes/vapours. Re-circulation of exhaust air is not recommended. Ensure the ventilation system is regularly maintained and tested (E74).

Cleaning of solids filtering equipment (PROC8a): Discharging to/from vessels (non-dedicated): Provide extract ventilation to points where emissions occur (E54). Ensure the ventilation system is regularly maintained and tested (E74).

Treatment and disposal of filtered solids (PROC3): Provide extract ventilation to points where emissions occur (E54). Ensure the ventilation system is regularly maintained and tested (E74).

Clean down and Maintenance (PROC8a): Drain or remove substance from equipment prior to break-in or maintenance (E81).

General process exposures from enclosed processes (PROC1 and PROC2): Store substance within a closed system. Ensure dedicated transfer points are provided. Avoid dip sampling.

#### Technical conditions and measures to control dispersion from source towards the worker

Ventilation	Local exhaust ventilation is required for: - PROC4 when used at elevated temperatures of up to 60°C
Efficiency rate	90%

#### Organisational measures to prevent /limit releases, dispersion and exposure

- Provide a good standard of general ventilation. Natural ventilation is from windows and doors etc. Controlled ventilation means air is supplied or removed by a powered fan [E1]
- Avoid manual contact with wet work pieces [EI17]
- Avoid splashing [C&H15]
- Assumes a good basic standard of occupational hygiene is implemented [G1]

#### Conditions and measures related to personal protection, hygiene and health evaluation

PPE to prevent dermal exposure	<ul style="list-style-type: none"> <li>- Wear suitable gloves tested to EN374 [PPE15] for activities, where direct contact with substance is possible</li> <li>- Wear suitable coveralls to prevent exposure to the skin [PPE27] for activities, where direct contact with substance is possible</li> <li>- Wear rubber boots [PPE28] for drill floor operations (PROC4)</li> </ul>
PPE to prevent eye exposure	- Use suitable eye protection [PPE26], where direct contact (e.g. splashes) with substance is possible
Respiratory protection	Not required
Respiratory PPE efficacy	N/A

#### Additional good practice advice (for environment) beyond the REACH CSA

None



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