



# SAFETY DATA SHEET

DOW EUROPE GMBH

Safety Data Sheet according to Reg. (EU) No 2015/830

**Product name:** DOWANOL™ PNB Glycol Ether

**Revision Date:** 27.08.2019

**Version:** 10.0

**Date of last issue:** 22.06.2017

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DOW EUROPE GMBH encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

## SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

### 1.1 Product identifier

**Product name:** DOWANOL™ PNB Glycol Ether

**Chemical name of the substance:** 3-butoxypropan-2-ol

**CASRN:** 5131-66-8

**EC-No.:** 225-878-4

**REACH Registration Number:** 01-2119475527-28-0000  
01-2119475527-28

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

**Identified uses:** Manufacture of substance, industrial. Formulation & (re)packing of substances and mixtures, industrial. Uses in Coatings, industrial. Uses in Coatings, professional. Uses in Coatings, consumer. Use in Cleaning Agents, industrial. Use in Cleaning Agents, professional. Use in Cleaning Agents, consumer. Use in Cosmetics, consumer. Use in Oil and Gas field drilling and production operations, professional. Use in Agrochemicals, professional. Use in Agrochemicals, consumer. Lubricants, consumer. Metal working fluids / rolling oils, professional.  
For details on use descriptors and exposure scenarios, please refer to the extended part of the Safety Data Sheet.

**Uses advised against:** Food additive

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

#### COMPANY IDENTIFICATION

DOW EUROPE GMBH  
BACHTOBELSTRASSE 3  
8810 HORGEN  
SWITZERLAND

**Customer Information Number:** 31 115 67 2626  
SDSQuestion@dow.com

### 1.4 EMERGENCY TELEPHONE NUMBER

**24-Hour Emergency Contact:** 00 41 447 28 2820

**Local Emergency Contact:** 00 31 115 69 4982

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## SECTION 2: HAZARDS IDENTIFICATION

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### 2.1 Classification of the substance or mixture

#### Classification according to Regulation (EC) No 1272/2008:

Skin irritation - Category 2 - H315

Eye irritation - Category 2 - H319

For the full text of the H-Statements mentioned in this Section, see Section 16.

### 2.2 Label elements

#### Labelling according to Regulation (EC) No 1272/2008:

##### Hazard pictograms



Signal word: **WARNING**

##### Hazard statements

H315 Causes skin irritation.

H319 Causes serious eye irritation.

##### Precautionary statements

P264 Wash skin thoroughly after handling.

P280 Wear protective gloves/ eye protection/ face protection.

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

P332 + P313 If skin irritation occurs: Get medical advice/ attention.

P337 + P313 If eye irritation persists: Get medical advice/ attention.

P362 + P364 Take off contaminated clothing and wash it before reuse.

### 2.3 Other hazards

This product contains no substances assessed to be PBT or vPvB at levels of 0.1% or higher.

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## SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

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### 3.1 Substances

This product is a substance.

CASRN / EC-No. / Index-No.	REACH Registration Number	Concentration	Component	Classification: REGULATION (EC) No 1272/2008

<b>CASRN</b> 5131-66-8 <b>EC-No.</b> 225-878-4 <b>Index-No.</b> 603-052-00-8	01-2119475527-28	> 95.0 %	3-butoxypropan-2- ol	Skin Irrit. - 2 - H315 Eye Irrit. - 2 - H319
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For the full text of the H-Statements mentioned in this Section, see Section 16.

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## SECTION 4: FIRST AID MEASURES

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### 4.1 Description of first aid measures

**General advice:**

If potential for exposure exists refer to Section 8 for specific personal protective equipment.

**Inhalation:** Move person to fresh air; if effects occur, consult a physician.

**Skin contact:** Wash off with plenty of water. Suitable emergency safety shower facility should be available in work area.

**Eye contact:** Flush eyes thoroughly with water for several minutes. Remove contact lenses after the initial 1-2 minutes and continue flushing for several additional minutes. If effects occur, consult a physician, preferably an ophthalmologist. Suitable emergency eye wash facility should be available in work area.

**Ingestion:** If swallowed, seek medical attention. Do not induce vomiting unless directed to do so by medical personnel.

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

Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), any additional important symptoms and effects are described in Section 11: Toxicology Information.

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

**Notes to physician:** No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

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## SECTION 5: FIREFIGHTING MEASURES

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### 5.1 Extinguishing media

**Suitable extinguishing media:** Water fog or fine spray.. Dry chemical fire extinguishers.. Carbon dioxide fire extinguishers.. Foam.. Alcohol resistant foams (ATC type) are preferred. General purpose synthetic foams (including AFFF) or protein foams may function, but will be less effective..

**Unsuitable extinguishing media:** No data available

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

**Hazardous combustion products:** During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating.. Combustion products may include and are not limited to:. Carbon monoxide.. Carbon dioxide..

**Unusual Fire and Explosion Hazards:** Container may rupture from gas generation in a fire situation.. Violent steam generation or eruption may occur upon application of direct water stream to hot liquids..

### 5.3 Advice for firefighters

**Fire Fighting Procedures:** Keep people away. Isolate fire and deny unnecessary entry.. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of reignition has passed.. Fight fire from protected location or safe distance. Consider the use of unmanned hose holders or monitor nozzles.. Immediately withdraw all personnel from the area in case of rising sound from venting safety device or discoloration of the container.. Do not use direct water stream. May spread fire.. Move container from fire area if this is possible without hazard.. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage.. Avoid accumulation of water. Product may be carried across water surface spreading fire or contacting an ignition source..

**Special protective equipment for firefighters:** Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves).. If protective equipment is not available or not used, fight fire from a protected location or safe distance..

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## SECTION 6: ACCIDENTAL RELEASE MEASURES

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**6.1 Personal precautions, protective equipment and emergency procedures:** Isolate area. Refer to section 7, Handling, for additional precautionary measures. Keep unnecessary and unprotected personnel from entering the area. No smoking in area. Keep personnel out of low areas. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.

**6.2 Environmental precautions:** Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.

**6.3 Methods and materials for containment and cleaning up:** Small spills: Absorb with materials such as: Sand. Vermiculite. Collect in suitable and properly labeled containers. Large spills: Contain spilled material if possible. Pump into suitable and properly labeled containers. See Section 13, Disposal Considerations, for additional information.

**6.4 Reference to other sections:** References to other sections, if applicable, have been provided in the previous sub-sections.

## SECTION 7: HANDLING AND STORAGE

**7.1 Precautions for safe handling:** Avoid contact with eyes, skin, and clothing. Wash thoroughly after handling. Containers, even those that have been emptied, can contain vapors. Do not cut, drill, grind, weld, or perform similar operations on or near empty containers. Keep away from heat, sparks and flame. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

Spills of these organic materials on hot fibrous insulations may lead to lowering of the autoignition temperatures possibly resulting in spontaneous combustion.

**7.2 Conditions for safe storage, including any incompatibilities:** Store in the following material(s): Carbon steel. Stainless steel. Phenolic lined steel drums. Do not store in: Aluminum. Copper. Galvanized iron. Galvanized steel. See Section 10 for more specific information.

**7.3 Specific end use(s):** See the technical data sheet on this product for further information.

## SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

If exposure limits exist, they are listed below. If no exposure limits are displayed, then no values are applicable.

Component	Regulation	Type of listing	Value
3-butoxypropan-2-ol	Dow IHG	TWA	50 ppm

### Derived No Effect Level

3-butoxypropan-2-ol

#### Workers

<i>Acute systemic effects</i>		<i>Acute local effects</i>		<i>Long-term systemic effects</i>		<i>Long-term local effects</i>	
Dermal	Inhalation	Dermal	Inhalation	Dermal	Inhalation	Dermal	Inhalation
n.a.	n.a.	n.a.	n.a.	52 mg/kg bw/day	147 mg/m <sup>3</sup>	n.a.	n.a.

#### Consumers

<i>Acute systemic effects</i>			<i>Acute local effects</i>		<i>Long-term systemic effects</i>			<i>Long-term local effects</i>	
Dermal	Inhalation	Oral	Dermal	Inhalation	Dermal	Inhalation	Oral	Dermal	Inhalation
n.a.	n.a.	n.a.	n.a.	n.a.	22 mg/kg bw/day	43 mg/m <sup>3</sup>	12.5 mg/kg bw/day	n.a.	n.a.

### Predicted No Effect Concentration

3-butoxypropan-2-ol

Compartment	PNEC
Fresh water	0.525 mg/l
Marine water	0.0525 mg/l
Intermittent use/release	5.25 mg/l
Sewage treatment plant	10 mg/l
Fresh water sediment	2.36 mg/kg dry weight (d.w.)

Marine sediment	0.236 mg/kg dry weight (d.w.)
Soil	0.16 mg/kg dry weight (d.w.)

## 8.2 Exposure controls

**Engineering controls:** Use local exhaust ventilation, or other engineering controls to maintain airborne levels below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, general ventilation should be sufficient for most operations. Local exhaust ventilation may be necessary for some operations.

### Individual protection measures

**Eye/face protection:** Use chemical goggles. Chemical goggles should be consistent with EN 166 or equivalent. If exposure causes eye discomfort, use a full-face respirator (meeting standard EN 136) with organic vapor cartridge (meeting standard EN 14387).

### Skin protection

**Hand protection:** Use chemical resistant gloves classified under Standard EN374: Protective gloves against chemicals and micro-organisms. Examples of preferred glove barrier materials include: Butyl rubber. Ethyl vinyl alcohol laminate ("EVAL"). Examples of acceptable glove barrier materials include: Natural rubber ("latex"). Neoprene. Nitrile/butadiene rubber ("nitrile" or "NBR"). Polyvinyl chloride ("PVC" or "vinyl"). When prolonged or frequently repeated contact may occur, a glove with a protection class of 4 or higher (breakthrough time greater than 120 minutes according to EN 374) is recommended. When only brief contact is expected, a glove with a protection class of 1 or higher (breakthrough time greater than 10 minutes according to EN 374) is recommended. Glove thickness alone is not a good indicator of the level of protection a glove provides against a chemical substance as this level of protection is also highly dependent on the specific composition of the material that the glove is fabricated from. The thickness of the glove must, depending on model and type of material, generally be more than 0.35 mm to offer sufficient protection for prolonged and frequent contact with the substance. As an exception to this general rule it is known that multilayer laminate gloves may offer prolonged protection at thicknesses less than 0.35 mm. Other glove materials with a thickness of less than 0.35 mm may offer sufficient protection when only brief contact is expected. NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.

**Other protection:** Use protective clothing chemically resistant to this material. Selection of specific items such as face shield, boots, apron, or full body suit will depend on the task.

**Respiratory protection:** Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, wear respiratory protection when adverse effects, such as respiratory irritation or discomfort have been experienced, or where indicated by your risk assessment process. For most conditions no respiratory protection should be needed; however, if discomfort is experienced, use an approved air-purifying respirator.

Use the following CE approved air-purifying respirator: Organic vapor cartridge, type A (boiling point >65 °C, meeting standard EN 14387).

### Environmental exposure controls

See SECTION 7: Handling and storage and SECTION 13: Disposal considerations for measures to prevent excessive environmental exposure during use and waste disposal.

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**SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES**

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**9.1 Information on basic physical and chemical properties****Appearance**

Physical state	Liquid.
Color	Colorless
Odor	Ether
Odor Threshold	No test data available
pH	No test data available
Melting point/range	-85 °C <i>Literature</i>
Freezing point	< -80 °C <i>Literature</i>
Boiling point (760 mmHg)	171 °C at 1,013 hPa <i>Literature</i>
Flash point	<b>closed cup</b> 62.5 °C at 721.0343 hPa <i>ASTM D3278</i>
Evaporation Rate (Butyl Acetate = 1)	No test data available
Flammability (solid, gas)	Not applicable to liquids
Lower explosion limit	1.1 % vol <i>Literature</i>
Upper explosion limit	8.4 % vol <i>Literature</i>
Vapor Pressure	1.05 mmHg at 25 °C <i>Literature</i>
Relative Vapor Density (air = 1)	4.6 <i>Literature</i>
Relative Density (water = 1)	0.878 at 25 °C / 25 °C <i>ASTM D891</i>
Water solubility	52 g/L at 20 °C <i>Literature</i>
Partition coefficient: n-octanol/water	log Pow: 1.2 <i>Measured</i>
Auto-ignition temperature	260 °C <i>Literature</i>
Decomposition temperature	No test data available
Dynamic Viscosity	2.8 mPa.s at 25 °C <i>Literature</i>
Kinematic Viscosity	3.85 mm <sup>2</sup> /s at 20 °C <i>Literature</i>
Explosive properties	Not explosive
Oxidizing properties	No

**9.2 Other information**

**Molecular weight** 132.2 g/mol *Literature*

NOTE: The physical data presented above are typical values and should not be construed as a specification.

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**SECTION 10: STABILITY AND REACTIVITY**

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**10.1 Reactivity:** No data available

**10.2 Chemical stability:** Stable under recommended storage conditions. See Storage, Section 7.

**10.3 Possibility of hazardous reactions:** Polymerization will not occur.

**10.4 Conditions to avoid:** Do not distill to dryness. Product can oxidize at elevated temperatures. Generation of gas during decomposition can cause pressure in closed systems.

**10.5 Incompatible materials:** Avoid contact with: Strong acids. Strong bases. Strong oxidizers.

**10.6 Hazardous decomposition products:** Decomposition products depend upon temperature, air supply and the presence of other materials.. Decomposition products can include and are not limited to:. Aldehydes.. Ketones.. Organic acids..

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## SECTION 11: TOXICOLOGICAL INFORMATION

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*Toxicological information appears in this section when such data is available.*

### 11.1 Information on toxicological effects

#### Acute toxicity

##### Acute oral toxicity

Low toxicity if swallowed. Small amounts swallowed incidentally as a result of normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause injury.

LD50, Rat, male and female, 3,300 mg/kg

##### Acute dermal toxicity

Prolonged skin contact is unlikely to result in absorption of harmful amounts.

LD50, Rat, male and female, > 2,000 mg/kg No deaths occurred at this concentration.

##### Acute inhalation toxicity

Brief exposure (minutes) is not likely to cause adverse effects. Based on the available data, respiratory irritation was not observed.

LC0, Rat, 4 Hour, vapour, > 3.5 mg/l No deaths occurred at this concentration.

#### Skin corrosion/irritation

Brief contact may cause moderate skin irritation with local redness.

#### Serious eye damage/eye irritation

May cause moderate eye irritation.

May cause slight corneal injury.

Effects are likely to heal readily.

Vapor may cause eye irritation experienced as mild discomfort and redness.

#### Sensitization

Did not cause allergic skin reactions when tested in guinea pigs.

For respiratory sensitization:

No relevant data found.

#### Specific Target Organ Systemic Toxicity (Single Exposure)

Evaluation of available data suggests that this material is not an STOT-SE toxicant.



**Specific Target Organ Systemic Toxicity (Repeated Exposure)**

Based on available data, repeated exposures are not anticipated to cause additional significant adverse effects.

**Carcinogenicity**

For similar material(s): Did not cause cancer in laboratory animals.

**Teratogenicity**

Did not cause birth defects or any other fetal effects in laboratory animals.

**Reproductive toxicity**

For similar material(s): In animal studies, did not interfere with reproduction.

**Mutagenicity**

In vitro genetic toxicity studies were negative.

**Aspiration Hazard**

Based on physical properties, not likely to be an aspiration hazard.

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**SECTION 12: ECOLOGICAL INFORMATION**

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*Ecotoxicological information appears in this section when such data is available.*

**12.1 Toxicity****Acute toxicity to fish**

Material is not classified as dangerous to aquatic organisms (LC50/EC50/IC50/LL50/EL50 greater than 100 mg/L in most sensitive species).

LC50, *Poecilia reticulata* (guppy), static test, 96 Hour, > 560 - 1,000 mg/l, OECD Test Guideline 203 or Equivalent

**Acute toxicity to aquatic invertebrates**

EC50, *Daphnia magna* (Water flea), static test, 48 Hour, > 1,000 mg/l, OECD Test Guideline 202 or Equivalent

**Acute toxicity to algae/aquatic plants**

EC50, *Pseudokirchneriella subcapitata* (green algae), static test, 96 Hour, Growth inhibition (cell density reduction), > 1,000 mg/l, OECD Test Guideline 201 or Equivalent

NOEC, *Pseudokirchneriella subcapitata* (green algae), static test, 96 Hour, Growth inhibition (cell density reduction), 560 mg/l, OECD Test Guideline 201 or Equivalent

**Toxicity to bacteria**

EC50, Bacteria, static test, 3 Hour, > 1,000 mg/l

**12.2 Persistence and degradability**

**Biodegradability:** Material is readily biodegradable. Passes OECD test(s) for ready biodegradability.

10-day Window: Pass

**Biodegradation:** 90 %

**Exposure time:** 28 d

**Method:** OECD Test Guideline 301E or Equivalent

### 12.3 Bioaccumulative potential

**Bioaccumulation:** Bioconcentration potential is low (BCF < 100 or Log Pow < 3).

**Partition coefficient: n-octanol/water(log Pow):** 1.2 at 20 °C Measured

### 12.4 Mobility in soil

Potential for mobility in soil is very high (Koc between 0 and 50).

**Partition coefficient (Koc):** 1.3 - 6.0 Estimated.

### 12.5 Results of PBT and vPvB assessment

This substance is not considered to be persistent, bioaccumulating and toxic (PBT). This substance is not considered to be very persistent and very bioaccumulating (vPvB).

### 12.6 Other adverse effects

This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

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## SECTION 13: DISPOSAL CONSIDERATIONS

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### 13.1 Waste treatment methods

This product, when being disposed of in its unused and uncontaminated state should be treated as a hazardous waste according to EC Directive 2008/98/EC. Any disposal practices must be in compliance with all national and provincial laws and any municipal or local by-laws governing hazardous waste. For used, contaminated and residual materials additional evaluations may be required. Do not dump into any sewers, on the ground, or into any body of water.

The definitive assignment of this material to the appropriate EWC group and thus its proper EWC code will depend on the use that is made of this material. Contact the authorized waste disposal services.

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## SECTION 14: TRANSPORT INFORMATION

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### Classification for ROAD and Rail transport (ADR/RID):

- |                                   |   |
|-----------------------------------|---|
| 14.1 UN number                    | Not applicable  |
| 14.2 UN proper shipping name      | Not regulated for transport                                       |
| 14.3 Transport hazard class(es)   | Not applicable  |
| 14.4 Packing group                | Not applicable  |
| 14.5 Environmental hazards        | Not considered environmentally hazardous based on available data. |
| 14.6 Special precautions for user | No data available.  |

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

- |                                 |                             |
|---------------------------------|-----------------------------|
| 14.1 UN number                  | Not applicable              |
| 14.2 UN proper shipping name    | Not regulated for transport |
| 14.3 Transport hazard class(es) | Not applicable              |
| 14.4 Packing group              | Not applicable              |

- 14.5 **Environmental hazards** Not considered as marine pollutant based on available data.
- 14.6 **Special precautions for user** No data available.
- 14.7 **Transport in bulk according to Annex I or II of MARPOL 73/78 and the IBC or IGC Code** Consult IMO regulations before transporting ocean bulk

**Classification for AIR transport (IATA/ICAO):**

- 14.1 **UN number** Not applicable
- 14.2 **UN proper shipping name** Not regulated for transport
- 14.3 **Transport hazard class(es)** Not applicable
- 14.4 **Packing group** Not applicable
- 14.5 **Environmental hazards** Not applicable
- 14.6 **Special precautions for user** No data available.

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Transportation classifications may vary by container volume and may be influenced by regional or country variations in regulations. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

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**SECTION 15: REGULATORY INFORMATION**

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**15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture****REACH Regulation (EC) No 1907/2006**

This product has been registered, according to Regulation (EC) No. 1907/2006 (REACH)., The aforementioned indications of the REACH registration status are provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. It is the buyer's/user's responsibility to ensure that his/her understanding of the regulatory status of this product is correct.

**REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, preparations and articles (Annex XVII)**

Conditions of restriction for the following entries should be considered:  
Number on list 3

**Seveso III: Directive 2012/18/EU of the European Parliament and of the Council on the control of major-accident hazards involving dangerous substances.**

Listed in Regulation: Not applicable

**15.2 Chemical safety assessment**

A Chemical Safety Assessment has been carried out for this substance.

**SECTION 16: OTHER INFORMATION****Full text of H-Statements referred to under sections 2 and 3.**

H315 Causes skin irritation.  
H319 Causes serious eye irritation.

**Product Literature**

Additional information on this product may be obtained by calling your sales or customer service contact.

**Revision**

Identification Number: 20853 / A305 / Issue Date: 27.08.2019 / Version: 10.0

Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

**Legend**

Dow IHG	Dow Industrial Hygiene Guideline
TWA	Time Weighted Average (TWA):
Eye Irrit.	Eye irritation
Skin Irrit.	Skin irritation

**Full text of other abbreviations**

ADN - European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways; ADR - European Agreement concerning the International Carriage of Dangerous Goods by Road; AICS - Australian Inventory of Chemical Substances; ASTM - American Society for the Testing of Materials; bw - Body weight; CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECHA - European Chemicals Agency; EC-Number - European Community number; ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the

Registration, Evaluation, Authorisation and Restriction of Chemicals; RID - Regulations concerning the International Carriage of Dangerous Goods by Rail; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; SVHC - Substance of Very High Concern; TCSI - Taiwan Chemical Substance Inventory; TRGS - Technical Rule for Hazardous Substances; TSCA - Toxic Substances Control Act (United States); UN - United Nations; vPvB - Very Persistent and Very Bioaccumulative

#### **Information Source and References**

This SDS is prepared by Product Regulatory Services and Hazard Communications Groups from information supplied by internal references within our company.

DOW EUROPE GMBH urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.

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## Annex

### Exposure Scenario

Number	Title
ES1	Manufacture of substance, industrial
ES2	Formulation & (re)packing of substances and mixtures, industrial
ES3	Uses in Coatings, industrial
ES4	Uses in Coatings, professional
ES5	Uses in Coatings, consumer
ES6	Use in Cleaning Agents, industrial
ES7	Use in Cleaning Agents, professional
ES8	Use in Cleaning Agents, consumer
ES9	Use in Cosmetics, consumer
ES10	Use in Oil and Gas field drilling and production operations, professional
ES11	Use in Agrochemicals, professional
ES12	Use in Agrochemicals, consumer
ES13	Lubricants, consumer
ES14	Metal working fluids / rolling oils, professional

**ES1: Manufacture of substance, industrial****1.1. Title section**

<b>Structured Short Title</b>	: Manufacture
<b>Substance</b>	: 3-butoxypropan-2-ol EC-No.: 225-878-4

Environment		
<b>CS1</b>		ERC1
Worker		
<b>CS2</b>	<b>General risk management measures applicable to all activities</b>	CS135
<b>CS3</b>	<b>General exposures (closed systems)</b>	PROC1
<b>CS4</b>	<b>General exposures (closed systems), Continuous process, With sample collection</b>	PROC2
<b>CS5</b>	<b>General exposures (closed systems), Use in contained batch processes</b>	PROC3
<b>CS6</b>	<b>General exposures (open systems)</b>	PROC4
<b>CS7</b>	<b>Process sampling, (closed systems)</b>	PROC2
<b>CS8</b>	<b>Equipment cleaning and maintenance</b>	PROC8a
<b>CS9</b>	<b>Bulk transfers, Dedicated facility</b>	PROC8b
<b>CS10</b>	<b>Bulk product storage, (closed systems)</b>	PROC2
<b>CS11</b>	<b>Laboratory activities</b>	PROC15

**1.2. Conditions of use affecting exposure****1.2.1. Control of environmental exposure: Manufacture of the substance (ERC1)**

Amount used, frequency and duration of use (or from service life)	
Release type	: Continuous release
Emission days	: 300
Technical and organisational conditions and measures	
Wet scrubber for gas removal. Treat air emission to provide a typical removal efficiency of (%): Air - minimum efficiency of 70 %	

<b>Conditions and measures related to sewage treatment plant</b>	
Municipal Sewage Treatment Plant Waste - minimum efficiency of 87.4 %	
Onsite and Municipal Sewage Treatment Plant Waste - minimum efficiency of 87.4 %	
<b>Conditions and measures related to treatment of waste (including article waste)</b>	
Waste treatment	: Dispose of waste product or used containers according to local regulations. Incinerate, absorb, or adsorb vapours stripped from solution whenever necessary.
<b>Other conditions affecting environmental exposure</b>	
Local freshwater dilution factor	: 10
Local marine water dilution factor	: 100
<b>Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply</b>	
Site should have a spill plan to ensure that adequate safeguards are in place to minimize the impact of episodic releases. Store finished products in closed containers (e.g., bulk tanks, drums, cans). Use vapour recovery units when necessary.	

### 1.2.2. Control of worker exposure: General measures applicable to all activities (CS135)

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wear gloves (tested to EN374) if hand contamination likely, wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop. Avoid direct eye contact with product, also via contamination on hands.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Use suitable eye protection.	



<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 1.2.3. Control of worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 1.2.4. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	

<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**1.2.5. Control of worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**1.2.6. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP

<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**1.2.7. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Ensure samples are obtained under containment or extract ventilation.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**1.2.8. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)**

<b>Product (article) characteristics</b>
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Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

#### 1.2.9. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

#### 1.2.10. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	

Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 1.2.11. Control of worker exposure: Use as laboratory reagent (PROC15)

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

## 1.3. Exposure estimation and reference to its source

### 1.3.1. Environmental release and exposure: Manufacture of the substance (ERC1)

Compartment	Exposure level	RCR
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Fresh water	(For the environmental assessment spERCs have been used; however some of the spERC values have been modified to better fit the scenario.)	0.252
Fresh water sediment	0.5940 mg/kg dry weight (d.w.)	0.252
Marine water	0.0132 mg/L	0.252
Marine sediment	0.0595 mg/kg dry weight (d.w.)	0.252
Soil	0.0238 mg/kg dry weight (d.w.)	0.149

#### Additional information on exposure estimation

Common practices vary across sites thus conservative process release estimates used.

#### 1.3.3. Worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	0.06 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	< 0.001
dermal	systemic	long-term	0.03 mg/kg bw/day	0.001
combined routes				0.001

#### 1.3.4. Worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	local	long-term	5.51 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.04
dermal	local	long-term	0.27 mg/kg bw/day	0.01
combined routes				0.04

#### 1.3.5. Worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	local	long-term	16.53 mg/m <sup>3</sup>	0.11

			(ECETOC TRA worker v2.0)	
dermal	local	long-term	0.14 mg/kg bw/day	0.003
combined routes				0.12

**1.3.6. Worker exposure: Chemical production where opportunity for exposure arises (PROC4)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	27.54 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.19
dermal	systemic	long-term	1.37 mg/kg bw/day	0.03
combined routes				0.21

**1.3.7. Worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	5.51 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.04
dermal	systemic	long-term	0.27 mg/kg bw/day	0.01
combined routes				0.04

**1.3.8. Worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	55.08 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.37
dermal	systemic	long-term	2.74 mg/kg bw/day	0.05
combined routes				0.43

**1.3.9. Worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	27.54 mg/m <sup>3</sup> (ECETOC TRA)	0.19

			worker v2.0)	
dermal	systemic	long-term	2.74 mg/kg bw/day	0.05
combined routes				0.24

**1.3.10. Worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	5.51 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.04
dermal	systemic	long-term	0.27 mg/kg bw/day	0.01
combined routes				0.04

**1.3.11. Worker exposure: Use as laboratory reagent (PROC15)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	27.54 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.19
dermal	systemic	long-term	0.07 mg/kg bw/day	0.001
combined routes				0.19

**1.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES**

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

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



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**ES2: Formulation & (re)packing of substances and mixtures, industrial**
**2.1. Title section**

<b>Structured Short Title</b>	: Formulation or re-packing
<b>Substance</b>	: 3-butoxypropan-2-ol EC-No.: 225-878-4

Environment		
<b>CS1</b>		ERC2
Worker		
<b>CS2</b>	<b>General risk management measures applicable to all activities</b>	CS135
<b>CS3</b>	<b>General exposures, Continuous process, no sampling, (closed systems)</b>	PROC1
<b>CS4</b>	<b>General exposures, Continuous process, With sample collection, (closed systems)</b>	PROC2
<b>CS5</b>	<b>General exposures, Use in contained batch processes, With sample collection</b>	PROC3
<b>CS6</b>	<b>General exposures (open systems)</b>	PROC4
<b>CS7</b>	<b>Batch processes at elevated temperatures, (closed systems)</b>	PROC3
<b>CS8</b>	<b>Process sampling, (closed systems)</b>	PROC3
<b>CS9</b>	<b>Bulk transfers, Dedicated facility, (closed systems)</b>	PROC8b
<b>CS10</b>	<b>Bulk transfers, Dedicated facility, (open systems)</b>	PROC8b
<b>CS11</b>	<b>Mixing operations (open systems)</b>	PROC5
<b>CS12</b>	<b>Transfer from/pouring from containers, Manual</b>	PROC8a
<b>CS13</b>	<b>Equipment cleaning and maintenance</b>	PROC8a
<b>CS14</b>	<b>Drum/batch transfers, Dedicated facility</b>	PROC8b
<b>CS15</b>	<b>Production or preparation of articles by tableting, compression, extrusion or pelletisation</b>	PROC14
<b>CS16</b>	<b>Drum and small package filling, Dedicated facility</b>	PROC9
<b>CS17</b>	<b>Bulk product storage, (closed systems)</b>	PROC2
<b>CS18</b>	<b>Laboratory activities</b>	PROC15

**2.2. Conditions of use affecting exposure****2.2.1. Control of environmental exposure: Formulation into mixture (ERC2)**

<b>Amount used, frequency and duration of use (or from service life)</b>	
Daily amount per site	: 2100 kg/day
Maximum allowable site tonnage (MSafe)	: 16,504 kg
Release type	: Continuous release
Emission days	: 300
<b>Conditions and measures related to sewage treatment plant</b>	
Municipal Sewage Treatment Plant Waste - minimum efficiency of 87.4 %	
Onsite and Municipal Sewage Treatment Plant Waste - minimum efficiency of 87.4 %	
<b>Conditions and measures related to treatment of waste (including article waste)</b>	
Waste treatment	: Dispose of waste product or used containers according to local regulations. Incinerate, absorb, or adsorb vapours stripped from solution whenever necessary.
<b>Other conditions affecting environmental exposure</b>	
Local freshwater dilution factor	: 10
Local marine water dilution factor	: 100
<b>Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply</b>	
Site should have a spill plan to ensure that adequate safeguards are in place to minimize the impact of episodic releases. Store finished products in closed containers (e.g., bulk tanks, drums, cans). Use vapour recovery units when necessary.	

### 2.2.2. Control of worker exposure: General measures applicable to all activities (CS135)

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours

<b>Technical and organisational conditions and measures</b>	
Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wear gloves (tested to EN374) if hand contamination likely, wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop. Avoid direct eye contact with product, also via contamination on hands.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Use suitable eye protection.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 2.2.3. Control of worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 2.2.4. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

<b>Product (article) characteristics</b>
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Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**2.2.5. Control of worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**2.2.6. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**2.2.7. Control of worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).

Assumes a good basic standard of occupational hygiene is implemented
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**2.2.8. Control of worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Ensure samples are obtained under containment or extract ventilation.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**2.2.9. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	

Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

#### 2.2.10. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

#### 2.2.11. Control of worker exposure: Mixing or blending in batch processes (PROC5)

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**2.2.12. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**2.2.13. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	



**2.2.14. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**2.2.15. Control of worker exposure: Tableting, compression, extrusion, pelettisation, granulation (PROC14)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**2.2.16. Control of worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**2.2.17. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**2.2.18. Control of worker exposure: Use as laboratory reagent (PROC15)**

<b>Product (article) characteristics</b>
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Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 2.3. Exposure estimation and reference to its source

#### 2.3.1. Environmental release and exposure: Formulation into mixture (ERC2)

Release route	Release rate	Release estimation method
Soil		ESVOC SPERC 2.2.v1
Water		ESVOC SPERC 2.2.v1
Air		ESVOC SPERC 2.2.v1

Compartment	Exposure level	RCR
Fresh water	(For the environmental assessment spERCs have been used; however some of the spERC values have been modified to better fit the scenario.)	0.124
Fresh water sediment	0.293 mg/kg dry weight (d.w.)	0.124
Marine water	0.007 mg/L	0.124
Marine sediment	0.029 mg/kg dry weight (d.w.)	0.124
Soil	0.012 mg/kg dry weight (d.w.)	0.077

#### 2.3.3. Worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
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inhalative	systemic	long-term	0.06 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	< 0.001
dermal	systemic	long-term	0.03 mg/kg bw/day	0.001
combined routes				0.001

**2.3.4. Worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	5.51 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.04
dermal	systemic	long-term	0.27 mg/kg bw/day	0.01
combined routes				0.04

**2.3.5. Worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	16.53 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.11
dermal	systemic	long-term	0.14 mg/kg bw/day	0.003
combined routes				0.12

**2.3.6. Worker exposure: Chemical production where opportunity for exposure arises (PROC4)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	27.54 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.19
dermal	systemic	long-term	1.37 mg/kg bw/day	0.03
combined routes				0.21

**2.3.7. Worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
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inhalative	systemic	long-term	55.08 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.37
dermal	systemic	long-term	0.14 mg/kg bw/day	0.003
combined routes				0.38

**2.3.8. Worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	16.53 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.11
dermal	systemic	long-term	0.14 mg/kg bw/day	0.003
combined routes				0.12

**2.3.9. Worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	27.54 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.19
dermal	systemic	long-term	2.74 mg/kg bw/day	0.05
combined routes				0.24

**2.3.10. Worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	27.54 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.19
dermal	systemic	long-term	2.74 mg/kg bw/day	0.05
combined routes				0.24

**2.3.11. Worker exposure: Mixing or blending in batch processes (PROC5)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
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inhalative	systemic	long-term	27.54 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.19
dermal	systemic	long-term	2.74 mg/kg bw/day	0.05
combined routes				0.24

**2.3.12. Worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	55.08 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.37
dermal	systemic	long-term	2.74 mg/kg bw/day	0.05
combined routes				0.43

**2.3.13. Worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	55.08 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.37
dermal	systemic	long-term	2.74 mg/kg bw/day	0.05
combined routes				0.43

**2.3.14. Worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	27.54 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.19
dermal	systemic	long-term	2.74 mg/kg bw/day	0.05
combined routes				0.24

**2.3.15. Worker exposure: Tableting, compression, extrusion, pelettisation, granulation (PROC14)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
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inhalative	systemic	long-term	27.54 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.19
dermal	systemic	long-term	0.69 mg/kg bw/day	0.01
combined routes				0.20

**2.3.16. Worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	27.54 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.19
dermal	systemic	long-term	1.37 mg/kg bw/day	0.03
combined routes				0.21

**2.3.17. Worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	5.51 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.04
dermal	systemic	long-term	0.27 mg/kg bw/day	0.01
combined routes				0.04

**2.3.18. Worker exposure: Use as laboratory reagent (PROC15)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	27.54 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.19
dermal	systemic	long-term	0.07 mg/kg bw/day	0.001
combined routes				0.19

**2.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES**

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

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



**ES3: Uses in Coatings, industrial****3.1. Title section**

<b>Structured Short Title</b>	: Use at industrial sites
<b>Substance</b>	: 3-butoxypropan-2-ol EC-No.: 225-878-4

Environment		
<b>CS1</b>		ERC4
Worker		
<b>CS2</b>	<b>General risk management measures applicable to all activities</b>	CS135
<b>CS3</b>	<b>General exposures (closed systems)</b>	PROC1
<b>CS4</b>	<b>General exposures (closed systems), With sample collection</b>	PROC2
<b>CS5</b>	<b>Film formation - force drying (50 - 100°C). Stoving (&gt;100°C). UV/EB radiation curing</b>	PROC2
<b>CS6</b>	<b>Mixing operations (closed systems), General exposures (closed systems)</b>	PROC3
<b>CS7</b>	<b>Film formation - air drying</b>	PROC4
<b>CS8</b>	<b>Preparation of material for application, Mixing operations (open systems)</b>	PROC5
<b>CS9</b>	<b>Spraying (automatic/robotic)</b>	PROC7
<b>CS10</b>	<b>Spraying, Manual</b>	PROC7
<b>CS11</b>	<b>Material transfers, Non-dedicated facility</b>	PROC8a
<b>CS12</b>	<b>Material transfers, Dedicated facility</b>	PROC8b
<b>CS13</b>	<b>Roller, spreader, flow application</b>	PROC10
<b>CS14</b>	<b>Dipping, immersion and pouring</b>	PROC13
<b>CS15</b>	<b>Laboratory activities</b>	PROC15
<b>CS16</b>	<b>Material transfers, Drum/batch transfers, Transfer from/pouring from containers, Dedicated facility</b>	PROC9
<b>CS17</b>	<b>Production or preparation or articles by tableting, compression, extrusion or pelletisation</b>	PROC14

### 3.2. Conditions of use affecting exposure

#### 3.2.1. Control of environmental exposure: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC4)

<b>Amount used, frequency and duration of use (or from service life)</b>	
Daily amount per site	: 1850 kg/day
Maximum allowable site tonnage (MSafe)	: 4,149 kg
Release type	: Continuous release
Emission days	: 300
<b>Conditions and measures related to sewage treatment plant</b>	
Municipal Sewage Treatment Plant Waste - minimum efficiency of 87.4 %	
Onsite and Municipal Sewage Treatment Plant Waste - minimum efficiency of 87.4 %	
<b>Conditions and measures related to treatment of waste (including article waste)</b>	
Waste treatment	: Dispose of waste product or used containers according to local regulations. Incinerate, absorb, or adsorb vapours stripped from solution whenever necessary.
<b>Other conditions affecting environmental exposure</b>	
Local freshwater dilution factor	: 10
Local marine water dilution factor	: 100
<b>Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply</b>	
Site should have a spill plan to ensure that adequate safeguards are in place to minimize the impact of episodic releases. Store finished products in closed containers (e.g., bulk tanks, drums, cans).	

#### 3.2.2. Control of worker exposure: General measures applicable to all activities (CS135)

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP

<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
<p>Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wear gloves (tested to EN374) if hand contamination likely, wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.</p> <p>Other skin protection measures such as impervious suits and face shields will be required during high dispersion activities e.g. spraying.</p> <p>Avoid direct eye contact with product, also via contamination on hands.</p>	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Use suitable eye protection.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 3.2.3. Control of worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**3.2.4. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**3.2.5. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	

Other conditions affecting workers exposure	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**3.2.6. Control of worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)**

Product (article) characteristics	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
Amount used, frequency and duration of use (or from service life)	
Duration	: Covers daily exposures up to 8 hours
Technical and organisational conditions and measures	
Handle substance within a closed system.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear suitable gloves tested to EN374.	
Other conditions affecting workers exposure	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**3.2.7. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)**

Product (article) characteristics	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
Amount used, frequency and duration of use (or from service life)	
Duration	: Covers daily exposures up to 8 hours

<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 3.2.8. Control of worker exposure: Mixing or blending in batch processes (PROC5)

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 3.2.9. Control of worker exposure: Industrial spraying (PROC7)

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Other skin protection measures such as impervious suits and face shields will be required during high dispersion activities e.g. spraying.	

Carry out in a vented booth or extracted enclosure.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 3.2.10. Control of worker exposure: Industrial spraying (PROC7)

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Other skin protection measures such as impervious suits and face shields will be required during high dispersion activities e.g. spraying.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear a respirator conforming to EN140 with Type A filter or better. Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 3.2.11. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP

<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 3.2.12. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 3.2.13. Control of worker exposure: Roller application or brushing (PROC10)

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours



<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 3.2.14. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 3.2.15. Control of worker exposure: Use as laboratory reagent (PROC15)

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	

<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 3.2.16. Control of worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 3.2.17. Control of worker exposure: Tableting, compression, extrusion, pelettisation, granulation (PROC14)

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	

Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 3.3. Exposure estimation and reference to its source

#### 3.3.1. Environmental release and exposure: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC4)

Release route	Release rate	Release estimation method
Soil		ESVOC SPERC 4.3a.v1
Water		ESVOC SPERC 4.3a.v1
Air		ESVOC SPERC 4.3a.v1

Compartment	Exposure level	RCR
Fresh water sediment	1.050 mg/kg dry weight (d.w.) (For the environmental assessment spERCs have been used; however some of the spERC values have been modified to better fit the scenario.)	0.445
Fresh water		0.446
Marine water	0.023 mg/L	0.446
Marine sediment	0.105 mg/kg dry weight (d.w.)	0.445
Soil	0.047 mg/kg dry weight (d.w.)	0.293

#### 3.3.3. Worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	0.06 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	< 0.001
dermal	systemic	long-term	0.03 mg/kg bw/day	0.001
combined routes				0.001

**3.3.4. Worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	5.51 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.04
dermal	systemic	long-term	0.27 mg/kg bw/day	0.01
combined routes				0.04

**3.3.5. Worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	27.54 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.19
dermal	systemic	long-term	0.27 mg/kg bw/day	0.01
combined routes				0.19

**3.3.6. Worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	16.53 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.11
dermal	systemic	long-term	0.14 mg/kg bw/day	0.003
combined routes				0.12

**3.3.7. Worker exposure: Chemical production where opportunity for exposure arises (PROC4)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	27.54 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.19
dermal	systemic	long-term	1.37 mg/kg bw/day	0.03
combined routes				0.21

**3.3.8. Worker exposure: Mixing or blending in batch processes (PROC5)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	27.54 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.19
dermal	systemic	long-term	2.74 mg/kg bw/day	0.05
combined routes				0.24

**3.3.9. Worker exposure: Industrial spraying (PROC7)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	27.54 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.19
dermal	systemic	long-term	8.57 mg/kg bw/day	0.16
combined routes				0.35

**3.3.10. Worker exposure: Industrial spraying (PROC7)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	55.08 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.37
dermal	systemic	long-term	8.57 mg/kg bw/day	0.16
combined routes				0.54

**3.3.11. Worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	55.08 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.37
dermal	systemic	long-term	2.74 mg/kg bw/day	0.05
combined routes				0.43

**3.3.12. Worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)**

Exposure route	Health effect	Exposure	Exposure level	RCR
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		indicator		
inhalative	systemic	long-term	27.54 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.19
dermal	systemic	long-term	2.74 mg/kg bw/day	0.05
combined routes				0.24

**3.3.13. Worker exposure: Roller application or brushing (PROC10)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	55.08 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.37
dermal	systemic	long-term	5.49 mg/kg bw/day	0.11
combined routes				0.48

**3.3.14. Worker exposure: Treatment of articles by dipping and pouring (PROC13)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	55.08 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.37
dermal	systemic	long-term	2.74 mg/kg bw/day	0.05
combined routes				0.43

**3.3.15. Worker exposure: Use as laboratory reagent (PROC15)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	27.54 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.19
dermal	systemic	long-term	0.07 mg/kg bw/day	0.001
combined routes				0.19

**3.3.16. Worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	27.54 mg/m <sup>3</sup> (ECETOC TRA)	0.19

			worker v2.0)	
dermal	systemic	long-term	1.37 mg/kg bw/day	0.03
combined routes				0.21

### 3.3.17. Worker exposure: Tableting, compression, extrusion, pelettisation, granulation (PROC14)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	27.54 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.19
dermal	systemic	long-term	0.69 mg/kg bw/day	0.01
combined routes				0.20

### 3.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

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

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

**ES4: Uses in Coatings, professional****4.1. Title section**

<b>Structured Short Title</b>	: Widespread use by professional workers
<b>Substance</b>	: 3-butoxypropan-2-ol EC-No.: 225-878-4

Environment		
<b>CS1</b>		ERC8a, ERC8d
Worker		
<b>CS2</b>	<b>General risk management measures applicable to all activities</b>	CS135
<b>CS3</b>	<b>General exposures (closed systems)</b>	PROC1
<b>CS4</b>	<b>Filling/ preparation of equipment from drums or containers.</b>	PROC2
<b>CS5</b>	<b>General exposures (closed systems), Use in contained systems</b>	PROC2
<b>CS6</b>	<b>Preparation of material for application</b>	PROC3
<b>CS7</b>	<b>Film formation - air drying, Outdoor</b>	PROC4
<b>CS8</b>	<b>Film formation - air drying, Indoor</b>	PROC4
<b>CS9</b>	<b>Preparation of material for application, Indoor</b>	PROC5
<b>CS10</b>	<b>Preparation of material for application, Outdoor</b>	PROC5
<b>CS11</b>	<b>Material transfers, Drum/batch transfers, Non-dedicated facility</b>	PROC8a
<b>CS12</b>	<b>Material transfers, Dedicated facility, Drum/batch transfers</b>	PROC8b
<b>CS13</b>	<b>Roller, spreader, flow application, Indoor</b>	PROC10
<b>CS14</b>	<b>Roller, spreader, flow application, Outdoor</b>	PROC10
<b>CS15</b>	<b>Spraying, Manual, Outdoor</b>	PROC11
<b>CS16</b>	<b>Spraying, Manual, Indoor</b>	PROC11
<b>CS17</b>	<b>Dipping, immersion and pouring, Indoor</b>	PROC13
<b>CS18</b>	<b>Dipping, immersion and pouring, Outdoor</b>	PROC13
<b>CS19</b>	<b>Laboratory activities</b>	PROC15
<b>CS20</b>	<b>Hand application - fingerpaints, pastels, adhesives, Indoor</b>	PROC19
<b>CS21</b>	<b>Hand application - fingerpaints, pastels, adhesives, Outdoor</b>	PROC19



## 4.2. Conditions of use affecting exposure

**4.2.1. Control of environmental exposure: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC8a) / Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC8d)**

<b>Amount used, frequency and duration of use (or from service life)</b>	
Daily amount per site	: 0.27 kg/day
Maximum allowable site tonnage (MSafe)	: 94 kg
Release type	: Continuous release
Emission days	: 365
<b>Conditions and measures related to sewage treatment plant</b>	
Municipal Sewage Treatment Plant Waste - minimum efficiency of 87.4 %	
Onsite and Municipal Sewage Treatment Plant Waste - minimum efficiency of 87.4 %	
<b>Conditions and measures related to treatment of waste (including article waste)</b>	
Waste treatment	: Dispose of waste product or used containers according to local regulations.
<b>Other conditions affecting environmental exposure</b>	
Local freshwater dilution factor	: 10
Local marine water dilution factor	: 100

**4.2.2. Control of worker exposure: General measures applicable to all activities (CS135)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wear gloves (tested to EN374) if hand contamination likely, wash off any skin contamination immediately. Provide	

basic employee training to prevent / minimise exposures and to report any skin problems that may develop.  
Other skin protection measures such as impervious suits and face shields will be required during high dispersion activities e.g. spraying.  
Avoid direct eye contact with product, also via contamination on hands.

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

Use suitable eye protection.

#### Other conditions affecting workers exposure

Temperature : Assumes activities are at ambient temperature (unless stated differently).

Assumes a good basic standard of occupational hygiene is implemented

#### 4.2.3. Control of worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

##### Product (article) characteristics

Covers concentrations up to 100 %

Physical form of product : Liquid, vapour pressure < 0.5 kPa at STP

##### Amount used, frequency and duration of use (or from service life)

Duration : Covers daily exposures up to 8 hours

##### Technical and organisational conditions and measures

Handle substance within a closed system.

##### Other conditions affecting workers exposure

Temperature : Assumes activities are at ambient temperature (unless stated differently).

Assumes a good basic standard of occupational hygiene is implemented

#### 4.2.4. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

##### Product (article) characteristics

Covers concentrations up to 100 %

Physical form of product : Liquid, vapour pressure < 0.5 kPa at STP

<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**4.2.5. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**4.2.6. Control of worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**4.2.7. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).

Assumes a good basic standard of occupational hygiene is implemented
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#### 4.2.8. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

#### 4.2.9. Control of worker exposure: Mixing or blending in batch processes (PROC5)

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Provide extract ventilation to points where emissions occur.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).

Assumes a good basic standard of occupational hygiene is implemented

#### 4.2.10. Control of worker exposure: Mixing or blending in batch processes (PROC5)

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear a respirator conforming to EN140 with Type A filter or better. Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

#### 4.2.11. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers use up to 240 min
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**4.2.12. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**4.2.13. Control of worker exposure: Roller application or brushing (PROC10)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Provide extract ventilation to points where emissions occur.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**4.2.14. Control of worker exposure: Roller application or brushing (PROC10)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear a respirator conforming to EN140 with Type A filter or better. Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**4.2.15. Control of worker exposure: Non-industrial spraying (PROC11)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Other skin protection measures such as impervious suits and face shields will be required during high dispersion activities e.g. spraying.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear a respirator conforming to EN140 with Type A filter or better. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).



Assumes a good basic standard of occupational hygiene is implemented
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**4.2.16. Control of worker exposure: Non-industrial spraying (PROC11)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Other skin protection measures such as impervious suits and face shields will be required during high dispersion activities e.g. spraying. Carry out in a vented booth or extracted enclosure. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**4.2.17. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	

Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

#### 4.2.18. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

#### 4.2.19. Control of worker exposure: Use as laboratory reagent (PROC15)

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**4.2.20. Control of worker exposure: Manual activities involving hand contact (PROC19)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers use up to 240 min
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**4.2.21. Control of worker exposure: Manual activities involving hand contact (PROC19)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 100 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers use up to 240 min
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 4.3. Exposure estimation and reference to its source

#### 4.3.1. Environmental release and exposure: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC8a) / Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC8d)

Release route	Release rate	Release estimation method
Soil		ESVOC SPERC 8.3b.v1
Water		ESVOC SPERC 8.3b.v1
Air		ESVOC SPERC 8.3b.v1

Compartment	Exposure level	RCR
Fresh water	(For the environmental assessment spERCs have been used; however some of the spERC values have been modified to better fit the scenario.)	0.001
Fresh water sediment	0.00176 mg/kg dry weight (d.w.)	0.001
Marine water	0.00005 mg/L	0.001
Marine sediment	0.00024 mg/kg dry weight (d.w.)	0.001
Soil	0.00045 mg/kg dry weight (d.w.)	0.003

#### 4.3.3. Worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	0.06 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	< 0.001
dermal	systemic	long-term	0.03 mg/kg bw/day	0.001
combined routes				0.001

#### 4.3.4. Worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	27.54 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.19
dermal	systemic	long-term	0.27 mg/kg bw/day	0.01

combined routes				0.19
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**4.3.5. Worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	27.54 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.19
dermal	systemic	long-term	0.27 mg/kg bw/day	0.01
combined routes				0.19

**4.3.6. Worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	16.53 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.11
dermal	systemic	long-term	0.14 mg/kg bw/day	0.003
combined routes				0.12

**4.3.7. Worker exposure: Chemical production where opportunity for exposure arises (PROC4)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	55.08 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.37
dermal	systemic	long-term	1.37 mg/kg bw/day	0.03
combined routes				0.40

**4.3.8. Worker exposure: Chemical production where opportunity for exposure arises (PROC4)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	55.08 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.37
dermal	systemic	long-term	1.37 mg/kg bw/day	0.03
combined routes				0.40

**4.3.9. Worker exposure: Mixing or blending in batch processes (PROC5)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	11.02 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.07
dermal	systemic	long-term	2.74 mg/kg bw/day	0.05
combined routes				0.13

**4.3.10. Worker exposure: Mixing or blending in batch processes (PROC5)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	5.51 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.04
dermal	systemic	long-term	2.74 mg/kg bw/day	0.05
combined routes				0.09

**4.3.11. Worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	82.63 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.56
dermal	systemic	long-term	2.74 mg/kg bw/day	0.05
combined routes				0.61

**4.3.12. Worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	55.08 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.37
dermal	systemic	long-term	2.74 mg/kg bw/day	0.05
combined routes				0.43

**4.3.13. Worker exposure: Roller application or brushing (PROC10)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	27.54 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.19
dermal	systemic	long-term	5.49 mg/kg bw/day	0.11
combined routes				0.29

**4.3.14. Worker exposure: Roller application or brushing (PROC10)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	13.77 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.09
dermal	systemic	long-term	5.49 mg/kg bw/day	0.11
combined routes				0.20

**4.3.15. Worker exposure: Non-industrial spraying (PROC11)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	55.08 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.37
dermal	systemic	long-term	10.71 mg/kg bw/day	0.21
combined routes				0.58

**4.3.16. Worker exposure: Non-industrial spraying (PROC11)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	77.12 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.52
dermal	systemic	long-term	10.71 mg/kg bw/day	0.21
combined routes				0.73

**4.3.17. Worker exposure: Treatment of articles by dipping and pouring (PROC13)**

Exposure route	Health effect	Exposure	Exposure level	RCR
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		indicator		
inhalative	systemic	long-term	55.08 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.37
dermal	systemic	long-term	2.74 mg/kg bw/day	0.05
combined routes				0.43

**4.3.18. Worker exposure: Treatment of articles by dipping and pouring (PROC13)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	55.08 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.37
dermal	systemic	long-term	2.74 mg/kg bw/day	0.05
combined routes				0.43

**4.3.19. Worker exposure: Use as laboratory reagent (PROC15)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	27.54 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.19
dermal	systemic	long-term	0.07 mg/kg bw/day	0.001
combined routes				0.19

**4.3.20. Worker exposure: Manual activities involving hand contact (PROC19)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	49.58 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.34
dermal	systemic	long-term	14.14 mg/kg bw/day	0.27
combined routes				0.61

**4.3.21. Worker exposure: Manual activities involving hand contact (PROC19)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	49.58 mg/m <sup>3</sup> (ECETOC TRA)	0.34



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			worker v2.0)	
dermal	systemic	long-term	14.14 mg/kg bw/day	0.27
combined routes				0.61

#### 4.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

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

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

**ES5: Uses in Coatings, consumer****5.1. Title section**

<b>Structured Short Title</b>	: Consumer use; Various products (PC18, PC9a).
<b>Substance</b>	: 3-butoxypropan-2-ol EC-No.: 225-878-4

<b>Environment</b>		
<b>CS1</b>		ERC8a, ERC8d
<b>Consumer</b>		
<b>CS2</b>	<b>Waterborne latex wall paint</b>	PC9a
<b>CS3</b>		PC18

**5.2. Conditions of use affecting exposure**

**5.2.1. Control of environmental exposure: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC8a) / Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC8d)**

<b>Amount used, frequency and duration of use (or from service life)</b>		
Daily amount per site	:	0.039 kg/day
Release type	:	Continuous release
Emission days	:	365
<b>Conditions and measures related to treatment of waste (including article waste)</b>		
Waste treatment	:	Dispose of waste or used sacks/containers according to local regulations.
<b>Other conditions affecting environmental exposure</b>		
Local freshwater dilution factor	:	10
Local marine water dilution factor	:	100
<b>Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply</b>		
Do not pour down the drain.		

**5.2.2. Control of consumer exposure: Coatings and paints, thinners, paint removers (PC9a)**

<b>Product (article) characteristics</b>	
Avoid using at a product concentration greater than 10 %	
Physical form of product	: Liquid, vapour pressure > 10 Pa
<b>Amount used, frequency and duration of use (or from service life)</b>	
For each use event, covers use amounts up to	: 1.25 kg
Use frequency	: Covers frequency up to: 1 uses per day
Duration	: Covers exposure up to 120 min
<b>Other conditions affecting consumers exposure</b>	
Room size	: Covers use in room size of 20 m3
Temperature	: Covers use at ambient temperatures.
Ventilation rate	: Covers use under typical household ventilation.

**5.2.3. Control of consumer exposure: Ink and toners (PC18)**

<b>Product (article) characteristics</b>	
Avoid using at a product concentration greater than 10 %	
Physical form of product	: Liquid, vapour pressure > 10 Pa
<b>Amount used, frequency and duration of use (or from service life)</b>	
For each use event, covers use amounts up to	: 0.04 kg
Use frequency	: Covers frequency up to: 1 uses per day
Duration	: Covers exposure up to 120 min
<b>Other conditions affecting consumers exposure</b>	
Room size	: Covers use in room size of 20 m3
Temperature	: Covers use at ambient temperatures.

### 5.3. Exposure estimation and reference to its source

#### 5.3.1. Environmental release and exposure: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC8a) / Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC8d)

Release route	Release rate	Release estimation method
Soil		ESVOC SPERC 8.3c.v1
Water		ESVOC SPERC 8.3c.v1
Air		ESVOC SPERC 8.3c.v1

Compartment	Exposure level	RCR
Fresh water	(For the environmental assessment spERCs have been used; however some of the spERC values have been modified to better fit the scenario.)	0.001
Fresh water sediment	0.0016935 mg/kg dry weight (d.w.)	0.001
Marine water	0.0000510 mg/L	0.001
Marine sediment	0.0002292 mg/kg dry weight (d.w.)	0.001
Soil	0.0004511 mg/kg dry weight (d.w.)	0.003

#### 5.3.2. Consumer exposure: Coatings and paints, thinners, paint removers (PC9a)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	5.44 mg/kg bw/day (Consexpo v4.1)	0.13
dermal	systemic	long-term	5.54 mg/kg bw/day	0.25
combined routes				0.38

#### 5.3.3. Consumer exposure: Ink and toners (PC18)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	4.93 mg/kg bw/day (Consexpo v4.1)	0.11
dermal	systemic	long-term	1.19 mg/kg bw/day	0.05
combined routes				0.17

#### **5.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES**

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

Environment - Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Further details on scaling and control technologies are provided in SpERC factsheet <http://cefic.org/en/reach-for-industries-libraries.html>.

**ES6: Use in Cleaning Agents, industrial****6.1. Title section**

<b>Structured Short Title</b>	: Use at industrial sites
<b>Substance</b>	: 3-butoxypropan-2-ol EC-No.: 225-878-4

Environment		
<b>CS1</b>		ERC4
Worker		
<b>CS2</b>	<b>General risk management measures applicable to all activities</b>	CS135
<b>CS3</b>	<b>Bulk transfers, Non-dedicated facility</b>	PROC8a
<b>CS4</b>	<b>General exposures (closed systems)</b>	PROC1
<b>CS5</b>	<b>Use in contained systems, Automated process with (semi) closed systems.</b>	PROC2
<b>CS6</b>	<b>Use in contained systems, Automated process with (semi) closed systems., Drum/batch transfers</b>	PROC3
<b>CS7</b>	<b>Application of cleaning products in closed systems</b>	PROC2
<b>CS8</b>	<b>Filling/ preparation of equipment from drums or containers., Dedicated facility</b>	PROC8b
<b>CS9</b>	<b>Use in contained batch processes, Treatment by heating</b>	PROC4
<b>CS10</b>	<b>Degreasing small objects in cleaning station</b>	PROC13
<b>CS11</b>	<b>Cleaning with low-pressure washers</b>	PROC10
<b>CS12</b>	<b>Cleaning with high pressure washers</b>	PROC7
<b>CS13</b>	<b>Cleaning, Surfaces, no spraying, Manual</b>	PROC10

**6.2. Conditions of use affecting exposure****6.2.1. Control of environmental exposure: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC4)**

Amount used, frequency and duration of use (or from service life)	
Daily amount per site	: 5000 kg/day
Maximum allowable site tonnage (MSafe)	: 192,850 kg

Release type	:	Continuous release
Emission days	:	20
<b>Conditions and measures related to sewage treatment plant</b>		
Municipal Sewage Treatment Plant Waste - minimum efficiency of 87.4 %		
Onsite and Municipal Sewage Treatment Plant Waste - minimum efficiency of 87.4 %		
<b>Conditions and measures related to treatment of waste (including article waste)</b>		
Waste treatment	:	Dispose of waste product or used containers according to local regulations.
<b>Other conditions affecting environmental exposure</b>		
Local freshwater dilution factor	:	10
Local marine water dilution factor	:	100
<b>Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply</b>		
Site should have a spill plan to ensure that adequate safeguards are in place to minimize the impact of episodic releases.		

#### 6.2.2. Control of worker exposure: General measures applicable to all activities (CS135)

<b>Product (article) characteristics</b>		
Covers concentrations up to 25 %		
Physical form of product	:	Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>		
Duration	:	Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>		
<p>Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wear gloves (tested to EN374) if hand contamination likely, wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.</p> <p>Other skin protection measures such as impervious suits and face shields will be required during high dispersion activities e.g. spraying.</p> <p>Avoid direct eye contact with product, also via contamination on hands.</p>		
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>		

Use suitable eye protection.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 6.2.3. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 6.2.4. Control of worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	



Other conditions affecting workers exposure	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**6.2.5. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)**

Product (article) characteristics	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
Amount used, frequency and duration of use (or from service life)	
Duration	: Covers daily exposures up to 8 hours
Technical and organisational conditions and measures	
Handle substance within a closed system.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear suitable gloves tested to EN374.	
Other conditions affecting workers exposure	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**6.2.6. Control of worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)**

Product (article) characteristics	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
Amount used, frequency and duration of use (or from service life)	
Duration	: Covers daily exposures up to 8 hours

<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**6.2.7. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**6.2.8. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)**

<b>Product (article) characteristics</b>
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Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

#### 6.2.9. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

#### 6.2.10. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP

<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**6.2.11. Control of worker exposure: Roller application or brushing (PROC10)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**6.2.12. Control of worker exposure: Industrial spraying (PROC7)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers use up to 240 min

Technical and organisational conditions and measures	
Provide a good standard of controlled ventilation (5 to 10 air changes per hour). Other skin protection measures such as impervious suits and face shields will be required during high dispersion activities e.g. spraying.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear suitable gloves tested to EN374.	
Other conditions affecting workers exposure	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 6.2.13. Control of worker exposure: Roller application or brushing (PROC10)

Product (article) characteristics	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
Amount used, frequency and duration of use (or from service life)	
Duration	: Covers daily exposures up to 8 hours
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear suitable gloves tested to EN374.	
Other conditions affecting workers exposure	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

## 6.3. Exposure estimation and reference to its source

### 6.3.1. Environmental release and exposure: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC4)

Release route	Release rate	Release estimation method
Soil		ESVOC SPERC 4.4a.v1
Water		ESVOC SPERC 4.4a.v1

Air		ESVOC SPERC 4.4a.v1
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Compartment	Exposure level	RCR
Fresh water	(For the environmental assessment spERCs have been used; however some of the spERC values have been modified to better fit the scenario.)	0.007
Fresh water sediment	0.01585 mg/kg dry weight (d.w.)	0.007
Marine water	0.00037 mg/L	0.007
Marine sediment	0.00165 mg/kg dry weight (d.w.)	0.007
Soil	0.0041 mg/kg dry weight (d.w.)	0.026

#### 6.3.3. Worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	33.05 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.22
dermal	systemic	long-term	1.65 mg/kg bw/day	0.03
combined routes				0.26

#### 6.3.4. Worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	0.03 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	< 0.001
dermal	systemic	long-term	0.02 mg/kg bw/day	< 0.001
combined routes				0.001

#### 6.3.5. Worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	3.31 mg/m <sup>3</sup> (ECETOC TRA	0.02

			worker v2.0)	
dermal	systemic	long-term	0.16 mg/kg bw/day	0.003
combined routes				0.03

**6.3.6. Worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	9.92 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.07
dermal	systemic	long-term	0.08 mg/kg bw/day	0.002
combined routes				0.07

**6.3.7. Worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	3.31 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.02
dermal	systemic	long-term	0.16 mg/kg bw/day	0.003
combined routes				0.03

**6.3.8. Worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	16.53 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.11
dermal	systemic	long-term	1.65 mg/kg bw/day	0.03
combined routes				0.14

**6.3.9. Worker exposure: Chemical production where opportunity for exposure arises (PROC4)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	66.10 mg/m <sup>3</sup> (ECETOC TRA)	0.45

			worker v2.0)	
dermal	systemic	long-term	0.82 mg/kg bw/day	0.02
combined routes				0.47

**6.3.10. Worker exposure: Treatment of articles by dipping and pouring (PROC13)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	33.05 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.22
dermal	systemic	long-term	1.65 mg/kg bw/day	0.03
combined routes				0.26

**6.3.11. Worker exposure: Roller application or brushing (PROC10)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	33.05 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.22
dermal	systemic	long-term	3.29 mg/kg bw/day	0.06
combined routes				0.29

**6.3.12. Worker exposure: Industrial spraying (PROC7)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	59.49 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.40
dermal	systemic	long-term	5.14 mg/kg bw/day	0.10
combined routes				0.50

**6.3.13. Worker exposure: Roller application or brushing (PROC10)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	33.05 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.22
dermal	systemic	long-term	16.46 mg/kg bw/day	0.32



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combined routes				0.54
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#### 6.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

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

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

**ES7: Use in Cleaning Agents, professional****7.1. Title section**

<b>Structured Short Title</b>	: Widespread use by professional workers
<b>Substance</b>	: 3-butoxypropan-2-ol EC-No.: 225-878-4

<b>Environment</b>		
<b>CS1</b>		ERC8a, ERC8d
<b>Worker</b>		
<b>CS2</b>	<b>General risk management measures applicable to all activities</b>	CS135
<b>CS3</b>	<b>General exposures (closed systems)</b>	PROC1
<b>CS4</b>	<b>Filling/ preparation of equipment from drums or containers., Dedicated facility</b>	PROC8b
<b>CS5</b>	<b>Use in contained systems, Automated process with (semi) closed systems.</b>	PROC2
<b>CS6</b>	<b>Use in contained systems, Automated process with (semi) closed systems., Drum/batch transfers</b>	PROC3
<b>CS7</b>	<b>Semi-automated process. (e.g.: semi-automatic application of floor care and maintenance products)</b>	PROC4
<b>CS8</b>	<b>Filling/ preparation of equipment from drums or containers., Non-dedicated facility, Outdoor</b>	PROC8a
<b>CS9</b>	<b>Cleaning, Surfaces, Manual, Dipping, immersion and pouring</b>	PROC13
<b>CS10</b>	<b>Cleaning with low-pressure washers</b>	PROC10
<b>CS11</b>	<b>Cleaning with high pressure washers, Indoor</b>	PROC11
<b>CS12</b>	<b>Cleaning with high pressure washers, Outdoor</b>	PROC11
<b>CS13</b>	<b>Cleaning, Surfaces, Manual, Spraying</b>	PROC10
<b>CS14</b>	<b>Ad hoc manual application via trigger sprays, dipping, etc., Rolling, Brushing</b>	PROC10
<b>CS15</b>	<b>Application of cleaning products in closed systems</b>	PROC4
<b>CS16</b>	<b>Cleaning of medical devices</b>	PROC4

## 7.2. Conditions of use affecting exposure

**7.2.1. Control of environmental exposure: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC8a) / Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC8d)**

<b>Amount used, frequency and duration of use (or from service life)</b>	
Daily amount per site	: 0.52 kg/day
Maximum allowable site tonnage (MSafe)	: 184.62 kg
Release type	: Continuous release
Emission days	: 365
<b>Technical and organisational conditions and measures</b>	
Treat air emission to provide a typical removal efficiency of (%): Air - minimum efficiency of 70 %	
<b>Conditions and measures related to sewage treatment plant</b>	
Municipal Sewage Treatment Plant Waste - minimum efficiency of 87.4 %	
Onsite and Municipal Sewage Treatment Plant Waste - minimum efficiency of 87.4 %	
<b>Conditions and measures related to treatment of waste (including article waste)</b>	
Waste treatment	: Dispose of waste product or used containers according to local regulations.
<b>Other conditions affecting environmental exposure</b>	
Local freshwater dilution factor	: 10
Local marine water dilution factor	: 100

## 7.2.2. Control of worker exposure: General measures applicable to all activities (CS135)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours

<b>Technical and organisational conditions and measures</b>	
Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wear gloves (tested to EN374) if hand contamination likely, wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop. Other skin protection measures such as impervious suits and face shields will be required during high dispersion activities e.g. spraying. Avoid direct eye contact with product, also via contamination on hands.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Use suitable eye protection.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 7.2.3. Control of worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 7.2.4. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

<b>Product (article) characteristics</b>

Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**7.2.5. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**7.2.6. Control of worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**7.2.7. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	

<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

#### 7.2.8. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

#### 7.2.9. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).

differently).
Assumes a good basic standard of occupational hygiene is implemented

**7.2.10. Control of worker exposure: Roller application or brushing (PROC10)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**7.2.11. Control of worker exposure: Non-industrial spraying (PROC11)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Carry out in a vented booth or extracted enclosure. Other skin protection measures such as impervious suits and face shields will be required during high dispersion activities e.g. spraying.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	



Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 7.2.12. Control of worker exposure: Non-industrial spraying (PROC11)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Other skin protection measures such as impervious suits and face shields will be required during high dispersion activities e.g. spraying.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear a respirator conforming to EN140 with Type A filter or better. Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 7.2.13. Control of worker exposure: Roller application or brushing (PROC10)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	

<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**7.2.14. Control of worker exposure: Roller application or brushing (PROC10)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**7.2.15. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).

differently).
Assumes a good basic standard of occupational hygiene is implemented

### 7.2.16. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 7.3. Exposure estimation and reference to its source

#### 7.3.1. Environmental release and exposure: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC8a) / Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC8d)

Compartment	Exposure level	RCR
Fresh water	(For the environmental assessment spERCs have been used; however some of the spERC values have been modified to better fit the scenario.)	0.001
Fresh water sediment	0.00168 mg/kg dry weight (d.w.)	0.001
Marine water	0.00005 mg/L	0.001
Marine sediment	0.00023 mg/kg dry weight (d.w.)	0.001
Soil	0.00045 mg/kg dry weight (d.w.)	0.003

**7.3.3. Worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	0.03 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	< 0.001
dermal	systemic	long-term	0.02 mg/kg bw/day	< 0.001
combined routes				0.001

**7.3.4. Worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	33.05 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.22
dermal	systemic	long-term	1.65 mg/kg bw/day	0.03
combined routes				0.26

**7.3.5. Worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	16.53 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.11
dermal	systemic	long-term	0.16 mg/kg bw/day	0.003
combined routes				0.12

**7.3.6. Worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	9.92 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.07
dermal	systemic	long-term	0.08 mg/kg bw/day	0.002
combined routes				0.07

**7.3.7. Worker exposure: Chemical production where opportunity for exposure arises (PROC4)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	33.05 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.22
dermal	systemic	long-term	0.82 mg/kg bw/day	0.02
combined routes				0.24

**7.3.8. Worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	82.63 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.56
dermal	systemic	long-term	1.65 mg/kg bw/day	0.03
combined routes				0.59

**7.3.9. Worker exposure: Treatment of articles by dipping and pouring (PROC13)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	33.05 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.22
dermal	systemic	long-term	1.65 mg/kg bw/day	0.03
combined routes				0.26

**7.3.10. Worker exposure: Roller application or brushing (PROC10)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	82.63 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.56
dermal	systemic	long-term	3.29 mg/kg bw/day	0.06
combined routes				0.63

**7.3.11. Worker exposure: Non-industrial spraying (PROC11)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
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inhalative	systemic	long-term	66.10 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.45
dermal	systemic	long-term	12.86 mg/kg bw/day	0.25
combined routes				0.70

**7.3.12. Worker exposure: Non-industrial spraying (PROC11)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	33.05 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.22
dermal	systemic	long-term	12.86 mg/kg bw/day	0.25
combined routes				0.47

**7.3.13. Worker exposure: Roller application or brushing (PROC10)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	82.63 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.56
dermal	systemic	long-term	3.29 mg/kg bw/day	0.06
combined routes				0.63

**7.3.14. Worker exposure: Roller application or brushing (PROC10)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	82.63 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.56
dermal	systemic	long-term	3.29 mg/kg bw/day	0.06
combined routes				0.63

**7.3.15. Worker exposure: Chemical production where opportunity for exposure arises (PROC4)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	33.05 mg/m <sup>3</sup> (ECETOC TRA)	0.22

			worker v2.0)	
dermal	systemic	long-term	0.82 mg/kg bw/day	0.02
combined routes				0.24

#### 7.3.16. Worker exposure: Chemical production where opportunity for exposure arises (PROC4)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	33.05 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.22
dermal	systemic	long-term	0.82 mg/kg bw/day	0.02
combined routes				0.24

#### 7.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

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

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

**ES8: Use in Cleaning Agents, consumer****8.1. Title section**

<b>Structured Short Title</b>	: Consumer use; Washing and cleaning products (PC35).
<b>Substance</b>	: 3-butoxypropan-2-ol EC-No.: 225-878-4

<b>Environment</b>	
<b>CS1</b>	ERC8a, ERC8d
<b>Consumer</b>	
<b>CS2</b>	Cleaners, trigger sprays (all purpose cleaners, sanitary products, glass cleaners) PC35

**8.2. Conditions of use affecting exposure**

**8.2.1. Control of environmental exposure: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC8a) / Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC8d)**

<b>Amount used, frequency and duration of use (or from service life)</b>	
Daily amount per site	: 0.212 kg/day
Release type	: Continuous release
Emission days	: 365
<b>Other conditions affecting environmental exposure</b>	
Local freshwater dilution factor	: 10
Local marine water dilution factor	: 100

**8.2.2. Control of consumer exposure: Washing and cleaning products (PC35)**

<b>Product (article) characteristics</b>	
Avoid using at a product concentration greater than 5 %	
<b>Amount used, frequency and duration of use (or from service life)</b>	
For each use event, covers use	: 0.016 kg



amounts up to	
Use frequency	: Covers frequency up to: 1 uses per day
Duration	: Covers exposure up to 60 min
Use frequency	: Covers frequency up to: 365 times per year
<b>Other conditions affecting consumers exposure</b>	
Room size	: Covers use in room size of 15 m <sup>3</sup>
Temperature	: Covers use at ambient temperatures.
Ventilation rate	: Covers use under typical household ventilation.

### 8.3. Exposure estimation and reference to its source

#### 8.3.1. Environmental release and exposure: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC8a) / Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC8d)

Release route	Release rate	Release estimation method
Soil		ESVOC SPERC 8.4c.v1
Water		ESVOC SPERC 8.4c.v1
Air		ESVOC SPERC 8.4c.v1

Compartment	Exposure level	RCR
Fresh water	(For the environmental assessment spERCs have been used; however some of the spERC values have been modified to better fit the scenario.)	0.001
Fresh water sediment	0.0018329 mg/kg dry weight (d.w.)	0.001
Marine water	0.0000541 mg/L	0.001
Marine sediment	0.0002431 mg/kg dry weight (d.w.)	0.001
Soil	0.0004565 mg/kg dry weight (d.w.)	0.003

#### 8.3.2. Consumer exposure: Washing and cleaning products (PC35)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
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inhalative	systemic	long-term	0.216 mg/kg bw/day (Consexpo v4.1)	0.005
dermal	systemic	long-term	0.15 mg/kg bw/day	0.007
combined routes				0.01
oral	systemic	long-term	< 0.001 mg/kg bw/day	< 0.001

#### 8.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

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

Environment - Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Further details on scaling and control technologies are provided in SpERC factsheet <http://cefic.org/en/reach-for-industries-libraries.html>.

**ES9: Use in Cosmetics, consumer****9.1. Title section**

<b>Structured Short Title</b>	: Consumer use
<b>Substance</b>	: 3-butoxypropan-2-ol EC-No.: 225-878-4

<b>Environment</b>	
<b>CS1</b>	ERC8a, ERC8d

**9.2. Conditions of use affecting exposure**

**9.2.1. Control of environmental exposure: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC8a) / Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC8d)**

<b>Amount used, frequency and duration of use (or from service life)</b>	
Daily amount per site	: 0.017 kg/day
Release type	: Continuous release
Emission days	: 365
<b>Other conditions affecting environmental exposure</b>	
Local freshwater dilution factor	: 10
Local marine water dilution factor	: 100

**9.3. Exposure estimation and reference to its source**

**9.3.1. Environmental release and exposure: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC8a) / Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC8d)**

Compartment	Exposure level	RCR
Fresh water	(For the environmental assessment spERCs have been used; however some of the spERC values have been modified to better fit the	0.001

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	scenario.)	
Fresh water sediment	0.0017088 mg/kg dry weight (d.w.)	0.001
Marine water	0.0000515 mg/L	0.001
Marine sediment	0.0002312 mg/kg dry weight (d.w.)	0.001
Soil	0.0004548 mg/kg dry weight (d.w.)	0.003

#### 9.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Health - Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.

Environment - Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Further details on scaling and control technologies are provided in SpERC factsheet

<http://cefic.org/en/reach-for-industries-libraries.html>.

**ES10: Use in Oil and Gas field drilling and production operations, professional****10.1. Title section**

<b>Structured Short Title</b>	: Widespread use by professional workers
<b>Substance</b>	: 3-butoxypropan-2-ol EC-No.: 225-878-4

Environment		
<b>CS1</b>		ERC8d
Worker		
<b>CS2</b>	<b>General risk management measures applicable to all activities</b>	CS135
<b>CS3</b>	<b>Bulk transfers from tote tanks and supply vessels</b>	PROC8b
<b>CS4</b>	<b>Filling/ preparation of equipment from drums or containers.</b>	PROC8b
<b>CS5</b>	<b>Drilling mud (re-)formulation</b>	PROC3
<b>CS6</b>	<b>Drill floor operations</b>	PROC4
<b>CS7</b>	<b>Operation of solids filtering equipment - vapour exposures, Elevated temperature</b>	PROC4
<b>CS8</b>	<b>Operation of solids filtering equipment - aerosol exposures, Elevated temperature</b>	PROC4
<b>CS9</b>	<b>Cleaning of solids filtering equipment</b>	PROC8a
<b>CS10</b>	<b>Treatment and disposal of filtered solids</b>	PROC3
<b>CS11</b>	<b>Process sampling</b>	PROC3
<b>CS12</b>	<b>Material transfers, (closed systems)</b>	PROC1
<b>CS13</b>	<b>Pouring from small containers</b>	PROC8a
<b>CS14</b>	<b>Scale squeeze and removal operations</b>	PROC4
<b>CS15</b>	<b>Equipment cleaning and maintenance</b>	PROC8a
<b>CS16</b>	<b>General exposures, (closed systems)</b>	PROC1

**10.2. Conditions of use affecting exposure**

**10.2.1. Control of environmental exposure: Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC8d)**

<b>Amount used, frequency and duration of use (or from service life)</b>
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Daily amount per site	: 410 kg/day
Maximum allowable site tonnage (MSafe)	: 1,184.97 kg
Release type	: Continuous release
Emission days	: 30
<b>Conditions and measures related to sewage treatment plant</b>	
Municipal Sewage Treatment Plant Waste - minimum efficiency of 87.4 %	
Onsite and Municipal Sewage Treatment Plant Waste - minimum efficiency of 87.4 %	
<b>Conditions and measures related to treatment of waste (including article waste)</b>	
Waste treatment	: Dispose of waste product or used containers according to local regulations.
<b>Other conditions affecting environmental exposure</b>	
Local freshwater dilution factor	: 10
Local marine water dilution factor	: 100
<b>Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply</b>	
Site should have a spill plan to ensure that adequate safeguards are in place to minimize the impact of episodic releases.	

#### 10.2.2. Control of worker exposure: General measures applicable to all activities (CS135)

<b>Product (article) characteristics</b>	
Covers concentrations up to 5 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wear gloves (tested to EN374) if hand contamination likely, wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop. Avoid direct eye contact with product, also via contamination on hands.	

<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Use suitable eye protection.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

#### 10.2.3. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

<b>Product (article) characteristics</b>	
Covers concentrations up to 5 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

#### 10.2.4. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

<b>Product (article) characteristics</b>	
Covers concentrations up to 5 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	

Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**10.2.5. Control of worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 5 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**10.2.6. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 5 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours



<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

#### 10.2.7. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)

<b>Product (article) characteristics</b>	
Covers concentrations up to 5 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

#### 10.2.8. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)

<b>Product (article) characteristics</b>	
Covers concentrations up to 5 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	

Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

#### 10.2.9. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)

<b>Product (article) characteristics</b>	
Covers concentrations up to 5 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

#### 10.2.10. Control of worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

<b>Product (article) characteristics</b>	
Covers concentrations up to 5 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Wear suitable gloves tested to EN374.	
Other conditions affecting workers exposure	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**10.2.11. Control of worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)**

Product (article) characteristics	
Covers concentrations up to 5 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
Amount used, frequency and duration of use (or from service life)	
Duration	: Covers daily exposures up to 8 hours
Technical and organisational conditions and measures	
Ensure samples are obtained under containment or extract ventilation.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear suitable gloves tested to EN374.	
Other conditions affecting workers exposure	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**10.2.12. Control of worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)**

Product (article) characteristics	
Covers concentrations up to 5 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP

<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

#### 10.2.13. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)

<b>Product (article) characteristics</b>	
Covers concentrations up to 5 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

#### 10.2.14. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)

<b>Product (article) characteristics</b>	
Covers concentrations up to 5 %	

Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**10.2.15. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 5 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**10.2.16. Control of worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 5 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP

Amount used, frequency and duration of use (or from service life)	
Duration	: Covers daily exposures up to 8 hours
Technical and organisational conditions and measures	
Handle substance within a closed system.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear suitable gloves tested to EN374.	
Other conditions affecting workers exposure	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 10.3. Exposure estimation and reference to its source

#### 10.3.1. Environmental release and exposure: Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC8d)

Release route	Release rate	Release estimation method
Soil		ESVOC SPERC 8.5b.v1
Water		ESVOC SPERC 8.5b.v1
Air		ESVOC SPERC 8.5b.v1

Compartment	Exposure level	RCR
Fresh water	(For the environmental assessment spERCs have been used; however some of the spERC values have been modified to better fit the scenario.)	0.346
Fresh water sediment	0.815 mg/kg dry weight (d.w.)	0.345
Marine water	0.018 mg/L	0.346
Marine sediment	0.082 mg/kg dry weight (d.w.)	0.346
Soil	0.0320 mg/kg dry weight (d.w.)	0.200

**10.3.3. Worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	11.02 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.07
dermal	systemic	long-term	0.55 mg/kg bw/day	0.01
combined routes				0.09

**10.3.4. Worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	11.02 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.07
dermal	systemic	long-term	0.55 mg/kg bw/day	0.01
combined routes				0.09

**10.3.5. Worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	3.31 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.02
dermal	systemic	long-term	0.03 mg/kg bw/day	0.001
combined routes				0.02

**10.3.6. Worker exposure: Chemical production where opportunity for exposure arises (PROC4)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	11.02 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.07
dermal	systemic	long-term	0.27 mg/kg bw/day	0.01
combined routes				0.08

**10.3.7. Worker exposure: Chemical production where opportunity for exposure arises (PROC4)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	55.08 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.37
dermal	systemic	long-term	0.27 mg/kg bw/day	0.01
combined routes				0.38

**10.3.8. Worker exposure: Chemical production where opportunity for exposure arises (PROC4)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	1.00 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.01
dermal	systemic	long-term	0.27 mg/kg bw/day	0.01
combined routes				0.01

**10.3.9. Worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	27.54 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.19
dermal	systemic	long-term	0.55 mg/kg bw/day	0.01
combined routes				0.20

**10.3.10. Worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	3.31 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.02
dermal	systemic	long-term	0.03 mg/kg bw/day	0.001
combined routes				0.02



**10.3.11. Worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	3.31 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.02
dermal	systemic	long-term	0.03 mg/kg bw/day	0.001
combined routes				0.02

**10.3.12. Worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	0.01 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	< 0.001
dermal	systemic	long-term	0.001 mg/kg bw/day	< 0.001
combined routes				< 0.001

**10.3.13. Worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	27.54 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.19
dermal	systemic	long-term	0.55 mg/kg bw/day	0.01
combined routes				0.20

**10.3.14. Worker exposure: Chemical production where opportunity for exposure arises (PROC4)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	11.02 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.07
dermal	systemic	long-term	0.27 mg/kg bw/day	0.01
combined routes				0.08

**10.3.15. Worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	27.54 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.19
dermal	systemic	long-term	0.55 mg/kg bw/day	0.01
combined routes				0.20

**10.3.16. Worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	5.51 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.04
dermal	systemic	long-term	0.05 mg/kg bw/day	0.001
combined routes				0.04

**10.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES**

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

Environment - Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Further details on scaling and control technologies are provided in SpERC factsheet <http://cefic.org/en/reach-for-industries-libraries.html>.

**ES11: Use in Agrochemicals, professional****11.1. Title section**

<b>Structured Short Title</b>	: Widespread use by professional workers
<b>Substance</b>	: 3-butoxypropan-2-ol EC-No.: 225-878-4

Environment		
<b>CS1</b>		ERC8a, ERC8d
Worker		
<b>CS2</b>	<b>General risk management measures applicable to all activities</b>	CS135
<b>CS3</b>	<b>General exposures (closed systems)</b>	PROC1
<b>CS4</b>	<b>Transfer from/pouring from containers, Dedicated facility</b>	PROC8b
<b>CS5</b>	<b>Mixing operations (open systems), Outdoor</b>	PROC4
<b>CS6</b>	<b>Spraying/ fogging by manual application, Outdoor</b>	PROC11
<b>CS7</b>	<b>Spraying/ fogging by machine application</b>	PROC11
<b>CS8</b>	<b>Ad hoc manual application via trigger sprays, dipping, etc.</b>	PROC13
<b>CS9</b>	<b>Equipment cleaning and maintenance</b>	PROC8a
<b>CS10</b>	<b>Disposal of wastes, Outdoor</b>	PROC8a
<b>CS11</b>	<b>Storage, Outdoor</b>	PROC2

**11.2. Conditions of use affecting exposure**

**11.2.1. Control of environmental exposure: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC8a) / Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC8d)**

Amount used, frequency and duration of use (or from service life)	
Daily amount per site	: 0.034 kg/day
Maximum allowable site tonnage (MSafe)	: 11 kg
Release type	: Continuous release
Emission days	: 365

<b>Conditions and measures related to sewage treatment plant</b>	
Municipal Sewage Treatment Plant	Waste - minimum efficiency of 87.4 %
Onsite and Municipal Sewage Treatment Plant	Waste - minimum efficiency of 87.4 %
<b>Other conditions affecting environmental exposure</b>	
Local freshwater dilution factor	: 10
Local marine water dilution factor	: 100

### 11.2.2. Control of worker exposure: General measures applicable to all activities (CS135)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
<p>Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wear gloves (tested to EN374) if hand contamination likely, wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.</p> <p>Other skin protection measures such as impervious suits and face shields will be required during high dispersion activities e.g. spraying.</p> <p>Avoid direct eye contact with product, also via contamination on hands.</p>	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Use suitable eye protection.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 11.2.3. Control of worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**11.2.4. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**11.2.5. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)**

<b>Product (article) characteristics</b>
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Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

#### 11.2.6. Control of worker exposure: Non-industrial spraying (PROC11)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Other skin protection measures such as impervious suits and face shields will be required during high dispersion activities e.g. spraying.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear a respirator conforming to EN140 with Type A filter or better. Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

#### 11.2.7. Control of worker exposure: Non-industrial spraying (PROC11)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Other skin protection measures such as impervious suits and face shields will be required during high dispersion activities e.g. spraying. Carry out in a vented booth or extracted enclosure.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

#### 11.2.8. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**11.2.9. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**11.2.10. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	



### 11.2.11. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 11.3. Exposure estimation and reference to its source

#### 11.3.1. Environmental release and exposure: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC8a) / Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC8d)

Release route	Release rate	Release estimation method
Soil		ESVOC SPERC 8.11a.v1
Water		ESVOC SPERC 8.11a.v1
Air		ESVOC SPERC 8.11a.v1

Compartment	Exposure level	RCR
Fresh water sediment	0.0169 mg/kg dry weight (d.w.) (For the environmental assessment spERCs have been used; however some of the spERC values have been modified to better fit the	0.001

	scenario.)	
Marine water	5.10104 mg/L	0.001
Marine sediment	0.0022 mg/kg dry weight (d.w.)	0.001

### 11.3.3. Worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	0.03 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	< 0.001
dermal	systemic	long-term	0.02 mg/kg bw/day	< 0.001
combined routes				0.001

### 11.3.4. Worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	33.05 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.22
dermal	systemic	long-term	1.65 mg/kg bw/day	0.03
combined routes				0.26

### 11.3.5. Worker exposure: Chemical production where opportunity for exposure arises (PROC4)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	33.05 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.22
dermal	systemic	long-term	0.82 mg/kg bw/day	0.02
combined routes				0.24

### 11.3.6. Worker exposure: Non-industrial spraying (PROC11)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	33.05 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.22

dermal	systemic	long-term	12.86 mg/kg bw/day	0.25
combined routes				0.47

**11.3.7. Worker exposure: Non-industrial spraying (PROC11)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	66.10 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.45
dermal	systemic	long-term	12.86 mg/kg bw/day	0.25
combined routes				0.70

**11.3.8. Worker exposure: Treatment of articles by dipping and pouring (PROC13)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	33.05 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.22
dermal	systemic	long-term	1.65 mg/kg bw/day	0.03
combined routes				0.26

**11.3.9. Worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	82.63 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.56
dermal	systemic	long-term	1.65 mg/kg bw/day	0.03
combined routes				0.59

**11.3.10. Worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	82.63 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.56

dermal	systemic	long-term	1.65 mg/kg bw/day	0.03
combined routes				0.59

**11.3.11. Worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	16.53 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.11
dermal	systemic	long-term	0.16 mg/kg bw/day	0.003
combined routes				0.12

**11.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES**

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

Environment - Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Further details on scaling and control technologies are provided in SpERC factsheet <http://cefic.org/en/reach-for-industries-libraries.html>.

**ES12: Use in Agrochemicals, consumer****12.1. Title section**

<b>Structured Short Title</b>	: Consumer use; Plant protection products (PC27).
<b>Substance</b>	: 3-butoxypropan-2-ol EC-No.: 225-878-4

<b>Environment</b>	
<b>CS1</b>	ERC8a, ERC8d
<b>Consumer</b>	
<b>CS2</b>	PC27

**12.2. Conditions of use affecting exposure**

**12.2.1. Control of environmental exposure: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC8a) / Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC8d)**

<b>Amount used, frequency and duration of use (or from service life)</b>	
Daily amount per site	: 0.034 kg/day
Release type	: Continuous release
Emission days	: 365
<b>Conditions and measures related to treatment of waste (including article waste)</b>	
Waste treatment	: Dispose of waste or used sacks/containers according to local regulations.
<b>Other conditions affecting environmental exposure</b>	
Local freshwater dilution factor	: 10
Local marine water dilution factor	: 100

**12.2.2. Control of consumer exposure: Plant protection products (PC27)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 10 %	

Physical form of product	: Liquid, vapour pressure > 10 Pa
<b>Amount used, frequency and duration of use (or from service life)</b>	
For each use event, covers use amounts up to	: 0.001 kg
For each use event, covers use amounts up to	: 0 kg
Use frequency	: Covers frequency up to: 365 uses per day
Duration	: Covers exposure up to
Use frequency	: Covers frequency up to: 20 times per year

### 12.3. Exposure estimation and reference to its source

#### 12.3.1. Environmental release and exposure: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC8a) / Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC8d)

Release route	Release rate	Release estimation method
Soil		ESVOC SPERC 8.11b.v1
Water		ESVOC SPERC 8.11b.v1
Air		ESVOC SPERC 8.11b.v1

Compartment	Exposure level	RCR
Fresh water	(For the environmental assessment spERCs have been used; however some of the spERC values have been modified to better fit the scenario.)	0.001
Fresh water sediment	0.001692 mg/kg dry weight (d.w.)	0.001
Marine water	0.0000510 mg/L	0.001
Marine sediment	0.000229 mg/kg dry weight (d.w.)	0.001
Soil	0.000451 mg/kg dry weight (d.w.)	0.003

#### 12.3.2. Consumer exposure: Plant protection products (PC27)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	0.219 mg/kg bw/day (Consexpo v4.1)	0.005

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dermal	systemic	long-term	0.923 mg/kg bw/day	0.04
combined routes				0.06
oral	systemic	long-term	0.173 mg/kg bw/day	0.01

#### 12.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Health - Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Environment - Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Further details on scaling and control technologies are provided in SpERC factsheet <http://cefic.org/en/reach-for-industries-libraries.html>.

## ES13: Lubricants, consumer

## 13.1. Title section

<b>Structured Short Title</b>	: Use at industrial sites
<b>Substance</b>	: 3-butoxypropan-2-ol EC-No.: 225-878-4

Environment		
<b>CS1</b>		ERC4
Worker		
<b>CS2</b>	<b>General risk management measures applicable to all activities</b>	CS135
<b>CS3</b>	<b>General exposures (closed systems)</b>	PROC1
<b>CS4</b>	<b>General exposures (closed systems), Batch process</b>	PROC3
<b>CS5</b>	<b>General exposures (open systems), Batch process</b>	PROC4
<b>CS6</b>	<b>General exposures (closed systems), With sample collection</b>	PROC2
<b>CS7</b>	<b>Material transfers, Dedicated facility</b>	PROC8b
<b>CS8</b>	<b>Filling/ preparation of equipment from drums or containers.</b>	PROC8b
<b>CS9</b>	<b>Filling/ preparation of equipment from drums or containers.</b>	PROC9
<b>CS10</b>	<b>Process sampling</b>	PROC3
<b>CS11</b>	<b>Metal machining operations</b>	PROC17
<b>CS12</b>	<b>Metal machining operations, With potential for aerosol generation</b>	PROC17
<b>CS13</b>	<b>Treatment by dipping and pouring</b>	PROC13
<b>CS14</b>	<b>Spraying, Machine</b>	PROC7
<b>CS15</b>	<b>Roller, spreader, flow application</b>	PROC10
<b>CS16</b>	<b>Automated metal rolling/forming, Elevated temperature</b>	PROC2
<b>CS17</b>	<b>Semi-automated metal rolling/forming, Elevated temperature</b>	PROC17
<b>CS18</b>	<b>Semi-automated metal rolling/forming, With potential for aerosol generation, Elevated temperature</b>	PROC17
<b>CS19</b>	<b>Equipment cleaning and maintenance</b>	PROC8a
<b>CS20</b>	<b>Storage, (closed systems)</b>	PROC2



**13.2. Conditions of use affecting exposure****13.2.1. Control of environmental exposure: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC4)**

<b>Amount used, frequency and duration of use (or from service life)</b>	
Daily amount per site	: 3100 kg/day
Maximum allowable site tonnage (MSafe)	: 81,050.6 kg
Release type	: Continuous release
Emission days	: 20
<b>Conditions and measures related to sewage treatment plant</b>	
Municipal Sewage Treatment Plant Waste - minimum efficiency of 87.4 %	
Onsite and Municipal Sewage Treatment Plant Waste - minimum efficiency of 87.4 %	
<b>Conditions and measures related to treatment of waste (including article waste)</b>	
Waste treatment	: Dispose of waste or used sacks/containers according to local regulations.
<b>Other conditions affecting environmental exposure</b>	
Local freshwater dilution factor	: 10
Local marine water dilution factor	: 100
<b>Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply</b>	
Site should have a spill plan to ensure that adequate safeguards are in place to minimize the impact of episodic releases.	

**13.2.2. Control of worker exposure: General measures applicable to all activities (CS135)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours

<b>Technical and organisational conditions and measures</b>	
Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wear gloves (tested to EN374) if hand contamination likely, wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop. Other skin protection measures such as impervious suits and face shields will be required during high dispersion activities e.g. spraying. Avoid direct eye contact with product, also via contamination on hands.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Use suitable eye protection.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 13.2.3. Control of worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 13.2.4. Control of worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 13.2.5. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**13.2.6. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**13.2.7. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).

Assumes a good basic standard of occupational hygiene is implemented
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### 13.2.8. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 13.2.9. Control of worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**13.2.10. Control of worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**13.2.11. Control of worker exposure: Lubrication at high energy conditions in metal working operations (PROC17)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Other skin protection measures such as impervious suits and face shields will be required during high dispersion activities e.g. spraying. Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	

Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 13.2.12. Control of worker exposure: Lubrication at high energy conditions in metal working operations (PROC17)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Other skin protection measures such as impervious suits and face shields will be required during high dispersion activities e.g. spraying. Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 13.2.13. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	

Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**13.2.14. Control of worker exposure: Industrial spraying (PROC7)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Other skin protection measures such as impervious suits and face shields will be required during high dispersion activities e.g. spraying. Carry out in a vented booth or extracted enclosure.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**13.2.15. Control of worker exposure: Roller application or brushing (PROC10)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP



<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**13.2.16. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**13.2.17. Control of worker exposure: Lubrication at high energy conditions in metal working operations (PROC17)**

<b>Product (article) characteristics</b>
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Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Other skin protection measures such as impervious suits and face shields will be required during high dispersion activities e.g. spraying. Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 13.2.18. Control of worker exposure: Lubrication at high energy conditions in metal working operations (PROC17)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Other skin protection measures such as impervious suits and face shields will be required during high dispersion activities e.g. spraying.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	

Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 13.2.19. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 13.2.20. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	

Other conditions affecting workers exposure	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

### 13.3. Exposure estimation and reference to its source

#### 13.3.1. Environmental release and exposure: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC4)

Release route	Release rate	Release estimation method
Soil		ESVOC SPERC 4.7a.v1
Water		ESVOC SPERC 4.7a.v1
Air		ESVOC SPERC 4.7a.v1

Compartment	Exposure level	RCR
Fresh water	0.0895413 mg/kg dry weight (d.w.) (For the environmental assessment spERCs have been used; however some of the spERC values have been modified to better fit the scenario.)	0.038
Fresh water sediment	0.089541 mg/kg dry weight (d.w.)	0.038
Marine water	0.0020075 mg/L	0.038
Marine sediment	0.0090139 mg/kg dry weight (d.w.)	0.038
Soil	0.0038957 mg/kg dry weight (d.w.)	0.024

#### 13.3.3. Worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	0.03 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	< 0.001
dermal	systemic	long-term	0.02 mg/kg bw/day	< 0.001
combined routes				0.001

**13.3.4. Worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	9.92 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.07
dermal	systemic	long-term	0.08 mg/kg bw/day	0.002
combined routes				0.07

**13.3.5. Worker exposure: Chemical production where opportunity for exposure arises (PROC4)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	16.53 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.11
dermal	systemic	long-term	0.82	0.02
combined routes				0.13

**13.3.6. Worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	3.31 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.02
dermal	systemic	long-term	0.16 mg/kg bw/day	0.003
combined routes				0.03

**13.3.7. Worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	16.53 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.11
dermal	systemic	long-term	1.65 mg/kg bw/day	0.03
combined routes				0.14

**13.3.8. Worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	16.53 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.11
dermal	systemic	long-term	1.65 mg/kg bw/day	0.03
combined routes				0.14

**13.3.9. Worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	16.53 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.11
dermal	systemic	short-term	0.82 mg/kg bw/day	0.02
combined routes				0.13

**13.3.10. Worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	9.92 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.07
dermal	systemic	long-term	0.08 mg/kg bw/day	0.002
combined routes				0.07

**13.3.11. Worker exposure: Lubrication at high energy conditions in metal working operations (PROC17)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	6.61 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.04
dermal	systemic	long-term	3.29 mg/kg bw/day	0.06
combined routes				0.11

**13.3.12. Worker exposure: Lubrication at high energy conditions in metal working operations (PROC17)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	1.20 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.01
dermal	systemic	long-term	3.29 mg/kg bw/day	0.06
combined routes				0.07

**13.3.13. Worker exposure: Treatment of articles by dipping and pouring (PROC13)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	33.05 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.22
dermal	systemic	long-term	1.65 mg/kg bw/day	0.03
combined routes				0.26

**13.3.14. Worker exposure: Industrial spraying (PROC7)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	16.53 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.11
dermal	systemic	long-term	5.14 mg/kg bw/day	0.10
combined routes				0.21

**13.3.15. Worker exposure: Roller application or brushing (PROC10)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	33.05 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.22
dermal	systemic	long-term	3.29 mg/kg bw/day	0.06
combined routes				0.29

**13.3.16. Worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)**

Exposure route	Health effect	Exposure	Exposure level	RCR
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		indicator		
inhalative	systemic	long-term	3.31 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.02
dermal	systemic	long-term	0.16 mg/kg bw/day	0.003
combined routes				0.03

**13.3.17. Worker exposure: Lubrication at high energy conditions in metal working operations (PROC17)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	16.53 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.11
dermal	systemic	long-term	3.29 mg/kg bw/day	0.06
combined routes				0.18

**13.3.18. Worker exposure: Lubrication at high energy conditions in metal working operations (PROC17)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	1.20 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.01
dermal	systemic	long-term	3.29 mg/kg bw/day	0.06
combined routes				0.07

**13.3.19. Worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	33.05 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.22
dermal	systemic	long-term	1.65 mg/kg bw/day	0.03
combined routes				0.26

**13.3.20. Worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)**

Exposure route	Health effect	Exposure	Exposure level	RCR
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		indicator		
inhalative	systemic	long-term	3.31 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.02
dermal	systemic	long-term	0.16 mg/kg bw/day	0.003
combined routes				0.03

#### 13.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

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

Environment - Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Further details on scaling and control technologies are provided in SpERC factsheet <http://cefic.org/en/reach-for-industries-libraries.html>.

**ES14: Metal working fluids / rolling oils, professional****14.1. Title section**

<b>Structured Short Title</b>	: Widespread use by professional workers
<b>Substance</b>	: 3-butoxypropan-2-ol EC-No.: 225-878-4

Environment		
<b>CS1</b>		ERC8a, ERC8d
Worker		
<b>CS2</b>	<b>General risk management measures applicable to all activities</b>	CS135
<b>CS3</b>	<b>General exposures (closed systems)</b>	PROC1
<b>CS4</b>	<b>General exposures (closed systems), Batch process</b>	PROC3
<b>CS5</b>	<b>General exposures (open systems), Batch process</b>	PROC4
<b>CS6</b>	<b>General exposures (closed systems), With sample collection</b>	PROC2
<b>CS7</b>	<b>Material transfers, Dedicated facility</b>	PROC8b
<b>CS8</b>	<b>Filling/ preparation of equipment from drums or containers.</b>	PROC8b
<b>CS9</b>	<b>Filling/ preparation of equipment from drums or containers.</b>	PROC9
<b>CS10</b>	<b>Process sampling</b>	PROC3
<b>CS11</b>	<b>Metal machining operations</b>	PROC17
<b>CS12</b>	<b>Metal machining operations, With potential for aerosol generation</b>	PROC17
<b>CS13</b>	<b>Treatment by dipping and pouring</b>	PROC13
<b>CS14</b>	<b>Spraying</b>	PROC11
<b>CS15</b>	<b>Roller, spreader, flow application</b>	PROC10
<b>CS16</b>	<b>Equipment cleaning and maintenance</b>	PROC8a
<b>CS17</b>	<b>Storage, (closed systems)</b>	PROC2

**14.2. Conditions of use affecting exposure**

**14.2.1. Control of environmental exposure: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC8a) / Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC8d)**

<b>Amount used, frequency and duration of use (or from service life)</b>	
Daily amount per site	: 0.008 kg/day
Release type	: Continuous release
Emission days	: 365
<b>Conditions and measures related to sewage treatment plant</b>	
Municipal Sewage Treatment Plant Waste - minimum efficiency of 87.4 %	
<b>Conditions and measures related to treatment of waste (including article waste)</b>	
Waste treatment	: Dispose of waste or used sacks/containers according to local regulations.
<b>Other conditions affecting environmental exposure</b>	
Local freshwater dilution factor	: 10
Local marine water dilution factor	: 100

#### 14.2.2. Control of worker exposure: General measures applicable to all activities (CS135)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
<p>Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wear gloves (tested to EN374) if hand contamination likely, wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.</p> <p>Other skin protection measures such as impervious suits and face shields will be required during high dispersion activities e.g. spraying.</p> <p>Avoid direct eye contact with product, also via contamination on hands.</p>	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Use suitable eye protection.	
<b>Other conditions affecting workers exposure</b>	

Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

#### 14.2.3. Control of worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

#### 14.2.4. Control of worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	

<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

#### 14.2.5. Control of worker exposure: Chemical production where opportunity for exposure arises (PROC4)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

#### 14.2.6. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	

<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

#### 14.2.7. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

#### 14.2.8. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	

Wear suitable gloves tested to EN374.

**Other conditions affecting workers exposure**

Temperature : Assumes activities are at ambient temperature (unless stated differently).

Assumes a good basic standard of occupational hygiene is implemented

**14.2.9. Control of worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)**

**Product (article) characteristics**

Covers concentrations up to 25 %

Physical form of product : Liquid, vapour pressure < 0.5 kPa at STP

**Amount used, frequency and duration of use (or from service life)**

Duration : Covers daily exposures up to 8 hours

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

Wear suitable gloves tested to EN374.

**Other conditions affecting workers exposure**

Temperature : Assumes activities are at ambient temperature (unless stated differently).

Assumes a good basic standard of occupational hygiene is implemented

**14.2.10. Control of worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)**

**Product (article) characteristics**

Covers concentrations up to 25 %

Physical form of product : Liquid, vapour pressure < 0.5 kPa at STP

**Amount used, frequency and duration of use (or from service life)**

Duration : Covers daily exposures up to 8 hours

**Technical and organisational conditions and measures**

Handle substance within a closed system.

<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

#### 14.2.11. Control of worker exposure: Lubrication at high energy conditions in metal working operations (PROC17)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Other skin protection measures such as impervious suits and face shields will be required during high dispersion activities e.g. spraying. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

#### 14.2.12. Control of worker exposure: Lubrication at high energy conditions in metal working operations (PROC17)

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	



Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Other skin protection measures such as impervious suits and face shields will be required during high dispersion activities e.g. spraying. Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**14.2.13. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**14.2.14. Control of worker exposure: Non-industrial spraying (PROC11)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers use up to 60 min
<b>Technical and organisational conditions and measures</b>	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Other skin protection measures such as impervious suits and face shields will be required during high dispersion activities e.g. spraying.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**14.2.15. Control of worker exposure: Roller application or brushing (PROC10)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**14.2.16. Control of worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).
Assumes a good basic standard of occupational hygiene is implemented	

**14.2.17. Control of worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)**

<b>Product (article) characteristics</b>	
Covers concentrations up to 25 %	
Physical form of product	: Liquid, vapour pressure < 0.5 kPa at STP
<b>Amount used, frequency and duration of use (or from service life)</b>	
Duration	: Covers daily exposures up to 8 hours
<b>Technical and organisational conditions and measures</b>	
Handle substance within a closed system.	
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
Wear suitable gloves tested to EN374.	
<b>Other conditions affecting workers exposure</b>	
Temperature	: Assumes activities are at ambient temperature (unless stated differently).

Assumes a good basic standard of occupational hygiene is implemented
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### 14.3. Exposure estimation and reference to its source

#### 14.3.1. Environmental release and exposure: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC8a) / Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC8d)

Release route	Release rate	Release estimation method
Soil		ESVOC SPERC 9.7b.v1
Water		ESVOC SPERC 9.7b.v1
Air		ESVOC SPERC 9.7b.v1

Compartment	Exposure level	RCR
Fresh water	(For the environmental assessment spERCs have been used; however some of the spERC values have been modified to better fit the scenario.)	0.001
Fresh water sediment	0.001688 mg/kg dry weight (d.w.)	0.001
Marine water	0.000050 mg/L	0.001
Marine sediment	0.000228 mg/kg dry weight (d.w.)	0.001
Soil	0.000450 mg/kg dry weight (d.w.)	0.003

#### 14.3.3. Worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	0.03 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	< 0.001
dermal	systemic	long-term	0.02 mg/kg bw/day	< 0.001
combined routes				0.001

#### 14.3.4. Worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR

inhalative	systemic	long-term	9.92 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.07
dermal	systemic	long-term	0.08 mg/kg bw/day	0.002
combined routes				0.07

**14.3.5. Worker exposure: Chemical production where opportunity for exposure arises (PROC4)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	33.05 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.22
dermal	systemic	long-term	0.82 mg/kg bw/day	0.02
combined routes				0.24

**14.3.6. Worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	16.53 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.11
dermal	systemic	long-term	0.16 mg/kg bw/day	0.003
combined routes				0.12

**14.3.7. Worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	33.05 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.22
dermal	systemic	long-term	1.65 mg/kg bw/day	0.03
combined routes				0.26

**14.3.8. Worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	33.05 mg/m <sup>3</sup>	0.22

			(ECETOC TRA worker v2.0)	
dermal	systemic	long-term	1.65 mg/kg bw/day	0.03
combined routes				0.26

**14.3.9. Worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	33.05 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.22
dermal	systemic	long-term	0.82 mg/kg bw/day	0.02
combined routes				0.24

**14.3.10. Worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	9.92 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.07
dermal	systemic	long-term	0.08 mg/kg bw/day	0.002
combined routes				0.07

**14.3.11. Worker exposure: Lubrication at high energy conditions in metal working operations (PROC17)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	23.14 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.16
dermal	systemic	long-term	3.29 mg/kg bw/day	0.06
combined routes				0.22

**14.3.12. Worker exposure: Lubrication at high energy conditions in metal working operations (PROC17)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
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inhalative	systemic	long-term	4.20 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.03
dermal	systemic	long-term	3.29 mg/kg bw/day	0.06
combined routes				0.09

**14.3.13. Worker exposure: Treatment of articles by dipping and pouring (PROC13)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	33.05 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.22
dermal	systemic	long-term	1.65 mg/kg bw/day	0.03
combined routes				0.26

**14.3.14. Worker exposure: Non-industrial spraying (PROC11)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	46.27 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.31
dermal	systemic	long-term	12.86 mg/kg bw/day	0.25
combined routes				0.56

**14.3.15. Worker exposure: Roller application or brushing (PROC10)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	82.63 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.56
dermal	systemic	long-term	3.29 mg/kg bw/day	0.06
combined routes				0.63

**14.3.16. Worker exposure: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities (PROC8a)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	82.63 mg/m <sup>3</sup> (ECETOC TRA)	0.56

			worker v2.0)	
dermal	systemic	long-term	1.65 mg/kg bw/day	0.03
combined routes				0.59

**14.3.17. Worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)**

Exposure route	Health effect	Exposure indicator	Exposure level	RCR
inhalative	systemic	long-term	16.53 mg/m <sup>3</sup> (ECETOC TRA worker v2.0)	0.11
dermal	systemic	long-term	0.16 mg/kg bw/day	0.003
combined routes				0.12

**14.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES**

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

Environment - Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Further details on scaling and control technologies are provided in SpERC factsheet <http://cefic.org/en/reach-for-industries-libraries.html>.