SAFETY DATA SHEET
according to Regulation (EC) No. 1907/2006, as amended by Commission Regulation (EU) 2020/878

NANOBYK-3650

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SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Trade name : NANOBYK-3650

UFI : Q6H4-U0TS-1000-88W0

Product code : 000000000000141493

This substance/ mixture contains nanoforms (according to REACH Regulation)

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

Use of the Substance/Mixture : Additive to Improve Mechanical Properties

1.3 Details of the supplier of the safety data sheet

Company : BYK-Chemie GmbH
Abelstrasse 45
46483 Wesel
Telephone : +49 281 670-0
Telefax : +49 281 65735

Information : Regulatory Affairs
Telephone : +49 281 670-23532
Telefax : +49 281 670-23533
E-mail address : GHS.BYK@altana.com

1.4 Emergency telephone number

+44 1235 239670

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification (REGULATION (EC) No 1272/2008)

Flammable liquids, Category 3	H226: Flammable liquid and vapour.
Specific target organ toxicity - single exposure, Category 3, Central nervous system	H336: May cause drowsiness or dizziness.

2.2 Label elements

Labelling (REGULATION (EC) No 1272/2008)

Hazard pictograms :



Signal word : Warning

Hazard statements : H226 Flammable liquid and vapour.
H336 May cause drowsiness or dizziness.

Precautionary statements : **Prevention:**
P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P261 Avoid breathing mist or vapours.

Response:
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water.
P304 + P340 + P312 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.

Storage:
P403 + P233 Store in a well-ventilated place. Keep container tightly closed.

Hazardous components which must be listed on the label:

- 108-65-6 2-methoxy-1-methylethyl acetate

2.3 Other hazards

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

Ecological information: The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

Toxicological information: The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Chemical nature : Dispersion of surface treated silica nanoparticles

Components

Chemical name	CAS-No. EC-No. Index-No. Registration number	Classification	Concentration (% w/w)

2-methoxy-1-methylethyl acetate	108-65-6 203-603-9 01-2119475791-29	STOT SE 3; H336 Flam. Liq. 3; H226	>= 30 - < 50
1-methoxy-2-propanol	107-98-2 203-539-1 01-2119457435-35	Flam. Liq. 3; H226 STOT SE 3; H336 (Central nervous system)	>= 10 - < 12,5

For explanation of abbreviations see section 16.

This substance/ mixture contains nanoforms (according to REACH Regulation)

Components:

Silicon dioxide:

Particle characteristics

Particle Size Distribution	:	D50 = 20 nm ± 5 nm Measurement technique: Transmission Electron Microscopy / Electron Microscopy (TEM/EM) calculation
Assessment	:	This substance/ mixture contains nanoforms (according to REACH Regulation)
Shape	:	Shape: spheres
Crystallinity	:	Crystallinity: amorphous
Surface treatment /Coatings	:	Surface treatment /Coatings: yes Properties of Coated Particle: hydrophobic

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice	:	Move out of dangerous area. Show this safety data sheet to the doctor in attendance. Do not leave the victim unattended.
If inhaled	:	Consult a physician after significant exposure. If unconscious, place in recovery position and seek medical advice.
In case of skin contact	:	If on skin, rinse well with water. If on clothes, remove clothes.
In case of eye contact	:	Flush eyes with water as a precaution. Remove contact lenses. Protect unharmed eye. Keep eye wide open while rinsing.

If eye irritation persists, consult a specialist.

If swallowed : Keep respiratory tract clear.
Do not give milk or alcoholic beverages.
Never give anything by mouth to an unconscious person.
If symptoms persist, call a physician.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms : No information available.

Risks : May cause drowsiness or dizziness.

4.3 Indication of any immediate medical attention and special treatment needed

Treatment : No information available.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media : Alcohol-resistant foam
Carbon dioxide (CO2)
Dry chemical

Unsuitable extinguishing media : High volume water jet

5.2 Special hazards arising from the substance or mixture

Specific hazards during firefighting : Do not allow run-off from fire fighting to enter drains or water courses.

Hazardous combustion products : Carbon oxides
Nitrogen oxides (NOx)

5.3 Advice for firefighters

Special protective equipment for firefighters : Wear self-contained breathing apparatus for firefighting if necessary.

Further information : Collect contaminated fire extinguishing water separately. This must not be discharged into drains.
Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.
For safety reasons in case of fire, cans should be stored separately in closed containments.
Use a water spray to cool fully closed containers.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal precautions : Remove all sources of ignition.
Evacuate personnel to safe areas.
Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

6.2 Environmental precautions

Environmental precautions : Prevent product from entering drains.
Prevent further leakage or spillage if safe to do so.
If the product contaminates rivers and lakes or drains inform respective authorities.

6.3 Methods and material for containment and cleaning up

Methods for cleaning up : Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

6.4 Reference to other sections

For disposal considerations see section 13., For personal protection see section 8.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling : Avoid formation of aerosol.
Do not breathe vapours/dust.
For personal protection see section 8.
Smoking, eating and drinking should be prohibited in the application area.
Take precautionary measures against static discharges.
Provide sufficient air exchange and/or exhaust in work rooms.
Open drum carefully as content may be under pressure.
Dispose of rinse water in accordance with local and national regulations.

Advice on protection against fire and explosion : Do not spray on a naked flame or any incandescent material.
Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapours). Keep away from open flames, hot surfaces and sources of ignition.

Hygiene measures : Wash hands before breaks and at the end of workday.

7.2 Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers : No smoking. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Observe label precautions. Electrical installations / working materials must comply with the technological safety

standards.

Further information on storage stability : No decomposition if stored and applied as directed.

7.3 Specific end use(s)

Specific use(s) : No data available

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational Exposure Limits

Components	CAS-No.	Value type (Form of exposure)	Control parameters	Basis
2-methoxy-1-methylethyl acetate	108-65-6	TWA	50 ppm 275 mg/m3	2000/39/EC
	Further information: Identifies the possibility of significant uptake through the skin, Indicative			
		STEL	100 ppm 550 mg/m3	2000/39/EC
	Further information: Identifies the possibility of significant uptake through the skin, Indicative			
		TWA	50 ppm 275 mg/m3	MT OEL
	Further information: A skin notation assigned to the OEL identifies the possibility of significant uptake through the skin.			
		STEL	100 ppm 550 mg/m3	MT OEL
	Further information: A skin notation assigned to the OEL identifies the possibility of significant uptake through the skin.			
1-methoxy-2-propanol	107-98-2	TWA	100 ppm 375 mg/m3	2000/39/EC
	Further information: Identifies the possibility of significant uptake through the skin, Indicative			
		STEL	150 ppm 568 mg/m3	2000/39/EC
	Further information: Identifies the possibility of significant uptake through the skin, Indicative			
		TWA	100 ppm 375 mg/m3	MT OEL
	Further information: A skin notation assigned to the OEL identifies the possibility of significant uptake through the skin.			
		STEL	150 ppm 568 mg/m3	MT OEL
	Further information: A skin notation assigned to the OEL identifies the possibility of significant uptake through the skin.			

Derived No Effect Level (DNEL) according to Regulation (EC) No. 1907/2006

Substance name	End Use	Exposure routes	Potential health effects	Value
2-methoxy-1-methylethyl acetate	Workers	Skin contact	Long-term systemic effects	796 mg/kg
	Workers	Inhalation	Long-term systemic effects	275 mg/m3
	Consumers	Skin contact	Long-term systemic effects	320 mg/kg
	Consumers	Inhalation	Long-term systemic effects	33 mg/m3
	Consumers	Ingestion	Long-term systemic effects	36 mg/kg
	Workers	Inhalation	Acute local effects	550 mg/m3
	Consumers	Inhalation	Acute local effects	33 mg/m3
1-methoxy-2-propanol	Workers	Inhalation	Acute local effects	553,5 mg/m3
	Workers	Skin contact	Long-term systemic effects	50,6 mg/kg
	Workers	Inhalation	Long-term systemic effects	369 mg/m3
	Consumers	Skin contact	Long-term systemic effects	18,1 mg/kg
	Consumers	Inhalation	Long-term systemic effects	43,9 mg/m3
	Consumers	Ingestion	Long-term systemic effects	3,3 mg/kg

Predicted No Effect Concentration (PNEC) according to Regulation (EC) No. 1907/2006

Substance name	Environmental Compartment	Value
2-methoxy-1-methylethyl acetate	Fresh water	0,635 mg/l
	Marine water	0,0635 mg/l
	Intermittent releases	6,35 mg/l
	Sewage treatment plant	100 mg/l
	Fresh water sediment	3,29 mg/kg
	Marine sediment	0,329 mg/kg
	Soil	0,29 mg/kg
1-methoxy-2-propanol	Fresh water	10 mg/l
	Marine water	1 mg/l
	Intermittent releases	100 mg/l
	Sewage treatment plant	100 mg/l
	Fresh water sediment	41,6 mg/kg
	Marine sediment	4,17 mg/kg
	Soil	2,47 mg/kg

8.2 Exposure controls

Personal protective equipment

Eye/face protection : Eye wash bottle with pure water
Tightly fitting safety goggles

Hand protection
Material : butyl-rubber
Break through time : > 480 min

Glove thickness	:	0,7 mm
Remarks	:	The suitability for a specific workplace should be discussed with the producers of the protective gloves.
Skin and body protection	:	Impervious clothing Choose body protection according to the amount and concentration of the dangerous substance at the work place.
Respiratory protection	:	In the case of vapour formation use a respirator with an approved filter.

Environmental exposure controls

General advice	:	Prevent product from entering drains. Prevent further leakage or spillage if safe to do so. If the product contaminates rivers and lakes or drains inform respective authorities.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state	:	dispersion
Colour	:	translucent
Odour	:	solvent-like
Odour Threshold	:	No data available
Melting point/ range	:	No data available
Initial boiling point	:	ca. 120 °C
Upper explosion limit / Upper flammability limit	:	ca. 13,7 %(V)
Lower explosion limit / Lower flammability limit	:	ca. 1,5 %(V)
Flash point	:	45 °C Method: 48 (Abel-Pensky) DIN 51755
Auto-ignition temperature	:	> 200 °C Method: DIN 51794
Decomposition temperature	:	No data available
pH	:	7 (20 °C) Concentration: 1 % Method: Universal pH-value indicator
Viscosity		

Viscosity, dynamic	:	10 mPa.s Method: 11 (NV, 20°C)
Solubility(ies)		
Water solubility	:	immiscible
Solubility in other solvents	:	No data available
Partition coefficient: n-octanol/water	:	No data available
Vapour pressure	:	ca. 3,8 hPa (20 °C) Method: calculated
Relative density	:	No data available
Density	:	1,15 g/cm3 (20 °C, 1.013 hPa) Method: 1 (20°C coating pycnometer)
Bulk density	:	Not applicable
Relative vapour density	:	No data available
Particle characteristics		
Assessment	:	This substance/ mixture contains nanoforms (according to REACH Regulation)
Particle size	:	Further particle properties for nanomaterials see section 3

9.2 Other information

Flammability (liquids)	:	Sustains combustion
Evaporation rate	:	No data available

SECTION 10: Stability and reactivity

10.1 Reactivity

No decomposition if stored and applied as directed.

10.2 Chemical stability

No decomposition if stored and applied as directed.

10.3 Possibility of hazardous reactions

Hazardous reactions	:	No decomposition if stored and applied as directed. Vapours may form explosive mixture with air.

10.4 Conditions to avoid

Conditions to avoid	:	Heat, flames and sparks.

10.5 Incompatible materials

Materials to avoid : Strong oxidizing agents

10.6 Hazardous decomposition products

No decomposition if stored and applied as directed.

SECTION 11: Toxicological information

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

Acute toxicity

Not classified due to lack of data.

Product:

Acute oral toxicity : Remarks: No data available

Components:

2-methoxy-1-methylethyl acetate:

Acute oral toxicity : LD50 (Rat, female): > 5.000 mg/kg
Method: OECD Test Guideline 401
GLP: yes

Acute inhalation toxicity : Remarks: No data available

Acute dermal toxicity : Remarks: No data available

1-methoxy-2-propanol:

Acute oral toxicity : LD50 (Rat, male and female): 4.016 mg/kg
Method: EC Directive 92/69/EEC B.1 Acute Toxicity (Oral)
GLP: yes

Acute dermal toxicity : LD50 (Rabbit, male and female): > 2.000 mg/kg
Method: Directive 67/548/EEC, Annex V, B.3.
GLP: yes

Skin corrosion/irritation

Not classified due to lack of data.

Product:

Remarks : No data available

Components:

2-methoxy-1-methylethyl acetate:

Species : Rabbit
Method : OECD Test Guideline 404
Result : No skin irritation

GLP : yes

1-methoxy-2-propanol:

Species : Rabbit
Method : Directive 67/548/EEC, Annex V, B.4.
Result : No skin irritation
GLP : yes

Serious eye damage/eye irritation

Not classified due to lack of data.

Components:

2-methoxy-1-methylethyl acetate:

Species : Rabbit
Method : OECD Test Guideline 405
Result : No eye irritation
GLP : yes

1-methoxy-2-propanol:

Species : Rabbit
Method : Directive 67/548/EEC, Annex V, B.5.
Result : No eye irritation
GLP : yes

Respiratory or skin sensitisation

Skin sensitisation

Not classified due to lack of data.

Respiratory sensitisation

Not classified due to lack of data.

Product:

Remarks : No data available

Components:

2-methoxy-1-methylethyl acetate:

Species : Guinea pig
Method : OECD Test Guideline 406
Result : Not a skin sensitizer.
GLP : yes

1-methoxy-2-propanol:

Test Type : Maximisation Test
Exposure routes : Dermal
Species : Guinea pig
Method : Directive 67/548/EEC, Annex V, B.6.

Result	:	Does not cause skin sensitisation.
GLP	:	yes

Germ cell mutagenicity

Not classified due to lack of data.

Product:

Genotoxicity in vitro	:	Remarks: No data available
Genotoxicity in vivo	:	Remarks: No data available

Carcinogenicity

Not classified due to lack of data.

Product:

Remarks	:	No data available

Reproductive toxicity

Not classified due to lack of data.

Product:

Effects on fertility	:	Remarks: No data available
Effects on foetal development	:	Remarks: No data available

STOT - single exposure

May cause drowsiness or dizziness.

Product:

Remarks	:	No data available

STOT - repeated exposure

Not classified due to lack of data.

Product:

Remarks	:	No data available

Repeated dose toxicity

Product:

Remarks	:	No data available

Aspiration toxicity

Not classified due to lack of data.

Product:

No data available

11.2 Information on other hazards

Endocrine disrupting properties

Not classified due to lack of data.

Product:

Assessment : The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

Further information

Product:

Remarks : Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting.
Concentrations substantially above the TLV value may cause narcotic effects.
Solvents may degrease the skin.

SECTION 12: Ecological information

12.1 Toxicity

Product:

Toxicity to fish : Remarks: No data available

Components:

2-methoxy-1-methylethyl acetate:

Toxicity to fish : LC50 (Fish): 100 - 180 mg/l
Exposure time: 96 h
Test Type: static test
Method: OECD Test Guideline 203
GLP: no

Toxicity to algae/aquatic plants : EC50 (Pseudokirchneriella subcapitata (green algae)): > 1.000 mg/l
Exposure time: 96 h
Test Type: static test
Method: OECD Test Guideline 201
GLP: no

1-methoxy-2-propanol:

Toxicity to fish : LC50 (Leuciscus idus (Golden orfe)): 6.812 mg/l
Exposure time: 96 h
Test Type: static test
Method: DIN 38412

GLP: no

12.2 Persistence and degradability

Product:

Biodegradability : Remarks: No data available

Components:

2-methoxy-1-methylethyl acetate:

Biodegradability : Result: Readily biodegradable.
Method: OECD Test Guideline 301F
GLP: yes

1-methoxy-2-propanol:

Biodegradability : Result: Readily biodegradable.
Method: OECD Test Guideline 301
GLP: yes

12.3 Bioaccumulative potential

Product:

Bioaccumulation : Remarks: No data available

Components:

2-methoxy-1-methylethyl acetate:

Partition coefficient: n-octanol/water : log Pow: 1,2 (20 °C)
pH: 6,8
Method: OECD Test Guideline 117
GLP: yes

1-methoxy-2-propanol:

Partition coefficient: n-octanol/water : log Pow: 0,37 (20 °C)
pH: 6,8
Method: OECD Test Guideline 117
GLP: No information available.

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

Product:

Assessment : This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Endocrine disrupting properties

Product:

Assessment : The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

12.7 Other adverse effects

Product:

Additional ecological information : No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product : Do not dispose of waste into sewer.
Do not contaminate ponds, waterways or ditches with chemical or used container.
Send to a licensed waste management company.

Contaminated packaging : Empty remaining contents.
Dispose of as unused product.
Do not re-use empty containers.
Do not burn, or use a cutting torch on, the empty drum.

SECTION 14: Transport information

14.1 UN number or ID number

ADR : UN 1993

IMDG : UN 1993

IATA : UN 1993

14.2 UN proper shipping name

ADR : FLAMMABLE LIQUID, N.O.S.
(1-Methoxy-2-propanol acetate, 1-Methoxy-2-propanol)

IMDG : FLAMMABLE LIQUID, N.O.S.
(1-Methoxy-2-propanol acetate, 1-Methoxy-2-propanol)

IATA : Flammable liquid, n.o.s.
(1-Methoxy-2-propanol acetate, 1-Methoxy-2-propanol)

14.3 Transport hazard class(es)

ADR : 3

IMDG : 3

IATA : 3

14.4 Packing group

ADR

Packing group	:	III
Classification Code	:	F1
Hazard Identification Number	:	30
Labels	:	3
Tunnel restriction code	:	D/E

IMDG

Packing group	:	III
Labels	:	3
EmS Code	:	F-E, S-E
Remarks	:	IMDG Code segregation group - none

IATA (Cargo)

Packing instruction (cargo aircraft)	:	366
Packing group	:	III
Labels	:	Flammable Liquids

IATA (Passenger)

Packing instruction (passenger aircraft)	:	355
Packing instruction (LQ)	:	Y344
Packing group	:	III
Labels	:	Flammable Liquids

14.5 Environmental hazards

ADR

Environmentally hazardous : no

IMDG

Marine pollutant : no

14.6 Special precautions for user

The transport classification(s) provided herein are for informational purposes only, and solely based upon the properties of the unpackaged material as it is described within this Safety Data Sheet. Transportation classifications may vary by mode of transportation, package sizes, and variations in regional or country regulations.

14.7 Maritime transport in bulk according to IMO instruments

Not applicable for product as supplied.

SECTION 15: Regulatory information

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

REACH - Restrictions on the manufacture, placing on : Conditions of restriction for the

the market and use of certain dangerous substances, mixtures and articles (Annex XVII)		following entries must be considered:: Number on list 3 Number on list 20: dibutyltin dilaurate, tributyltin compounds Number on list 75: If you intend to use this product as tattoo ink, please contact your vendor.
REACH - Candidate List of Substances of Very High Concern for Authorisation (Article 59).	:	This product does not contain substances of very high concern (Regulation (EC) No 1907/2006 (REACH), Article 57).
REACH - List of substances subject to authorisation (Annex XIV)	:	Not applicable
Fire Hazard Class	:	A II: Flash point 21 °C to 55 °C, at 15 °C not miscible in water
Seveso III: Directive 2012/18/EU of the European Parliament and of the Council on the control of major-accident hazards involving dangerous substances.	P5c	FLAMMABLE LIQUIDS

15.2 Chemical safety assessment

For further information see eSDS.

SECTION 16: Other information

Items where relevant changes have been made to the previous version are highlighted in the body of this document by two vertical lines.

Full text of H-Statements

H226	:	Flammable liquid and vapour.
H336	:	May cause drowsiness or dizziness.

Full text of other abbreviations

Flam. Liq.	:	Flammable liquids
STOT SE	:	Specific target organ toxicity - single exposure
2000/39/EC	:	Europe. Commission Directive 2000/39/EC establishing a first list of indicative occupational exposure limit values
MT OEL	:	Malta. Occupational Exposure Limits
2000/39/EC / TWA	:	Limit Value - eight hours
2000/39/EC / STEL	:	Short term exposure limit
MT OEL / TWA	:	Long term exposure limit
MT OEL / STEL	:	Occupational exposure limit value Short-term, 15 minute

ADN - European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways; ADR - Agreement concerning the International Carriage of Dangerous Goods by Road; AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; BGW - Biological Limit Values; 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 Harmonised 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 Organisation; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardisation; 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); LSPN - List of Hazardous Notified Substances (Chile); 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 - Organisation 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; TECI - Thailand Existing Chemicals Inventory; TRGS - Technical Rule for Hazardous Substances; TSCA - Toxic Substances Control Act (United States); UN - United Nations; vPvB - Very Persistent and Very Bioaccumulative

Further information

Classification of the mixture:		**Classification procedure:**
Flam. Liq. 3	H226	Based on product data or assessment
STOT SE 3	H336	Calculation method

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

MT / EN

Annex: Exposure Scenarios

Table of Contents

Number	Title
ES 1	Processing aid; Industrial uses (SU3).
ES 2	Formulation & (re)packing of substances and mixtures; Industrial uses (SU3).
ES 3	Use in coatings; Industrial uses (SU3).
ES 4	Use in coatings; Professional uses (SU22).
ES 5	Cleaning; Industrial uses (SU3).
ES 6	Cleaning; Professional uses (SU22).
ES 7	Use in coatings; Consumer uses (SU21).
ES 8	Cleaning; Consumer uses (SU21).

ES 1: Processing aid; Industrial uses (SU3).

1.1. Title section

Exposure Scenario name	:	Processing aid
Structured Short Title	:	Processing aid; Industrial uses (SU3).

Environment		
CS 1	**Use of non-reactive processing aid at industrial site (no inclusion into or onto article)**	ERC4
Worker		
CS 2	**Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions**	PROC1
CS 3	**Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions**	PROC2
CS 4	**Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition**	PROC3
CS 5	**Chemical production where opportunity for exposure arises**	PROC4
CS 6	**Transfer of substance or mixture (charging/discharging) at non dedicated-facilities**	PROC8a
CS 7	**Transfer of substance or mixture (charging/discharging) at dedicated facilities**	PROC8b
CS 8	**Use as laboratory reagent**	PROC15

1.2. Conditions of use affecting exposure

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

Product (article) characteristics		
Physical form of product	:	Liquid
Amount used (or contained in articles), frequency and duration of use/exposure		
Daily amount per site	:	2200 kg
Release type	:	Continuous release

Emission days	:	300
Technical and organisational conditions and measures		
Treat air emissions. Air - minimum efficiency of 87,3 %		
Conditions and measures related to sewage treatment plant		
STP type	:	Municipal sewage treatment plant
Conditions and measures related to treatment of waste (including article waste)		
Waste treatment	:	Dispose of waste product or used containers according to local regulations. Hazardous waste incineration
Other conditions affecting environmental exposure		
Local freshwater dilution factor	:	10
Local marine water dilution factor	:	100
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Site should have a spill plan to ensure that adequate safeguards are in place to minimize the impact of episodic releases. Vapour recovery (e.g. adsorption) When not in use, keep containers tightly closed.		

1.2.2. 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
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		

Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

1.2.3. 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
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

1.2.4. 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)

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid

Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

1.2.5. 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
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

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

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

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

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Clear transfer lines prior to de-coupling.		

Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

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

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

1.3. Exposure estimation and reference to its source

1.3.1. 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 4.20.v1
Water		ESVOC SPERC 4.20.v1
Air		ESVOC SPERC 4.20.v1

Protection Target	Exposure estimate	RCR

Freshwater	0,0022 mg/L	0,004
Freshwater sediment	0,0114 mg/kg dry weight	0,004
Marine water	0,0004 mg/L	0,006
Marine sediment	0,0020 mg/kg dry weight	0,006
Soil	0,00127 mg/kg dry weight	0,005

1.3.2. 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 estimate	RCR
inhalative	systemic	long-term	0,06 mg/m³ (ECETOC TRA worker v2.0)	
dermal	systemic	long-term	0,34 mg/kg bw/day	

1.3.3. 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 estimate	RCR
inhalative	systemic	long-term	5,51 mg/m³ (ECETOC TRA worker v2.0)	0,02
dermal	systemic	long-term	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes				0,03

1.3.4. 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 estimate	RCR
inhalative	systemic	long-term	16,53 mg/m³ (ECETOC TRA worker v2.0)	0,06
dermal	systemic	long-term	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	

combined routes				0,06

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

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	27,54 mg/m³ (ECETOC TRA worker v2.0)	0,10
dermal	systemic	long-term	6,86 mg/kg bw/day (ECETOC TRA worker v2.0)	0,04
combined routes				0,14

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

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	55,08 mg/m³ (ECETOC TRA worker v2.0)	0,20
dermal	systemic	long-term	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,09
combined routes				0,29

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

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	27,54 mg/m³ (ECETOC TRA worker v2.0)	0,10
dermal	systemic	long-term	6,86 mg/kg bw/day (ECETOC TRA worker v2.0)	0,04
combined routes				0,14

1.3.8. Worker exposure: Use as laboratory reagent (PROC15)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	0,06 mg/m³ (ECETOC TRA worker v2.0)	0,10
dermal	systemic	long-term	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	
combined routes				0,10

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

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.

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.

ES 2: Formulation & (re)packing of substances and mixtures; Industrial uses (SU3).

2.1. Title section

Exposure Scenario name	:	Formulation & (re)packing of substances and mixtures
Structured Short Title	:	Formulation & (re)packing of substances and mixtures; Industrial uses (SU3).

Environment		
CS 1	**Formulation into mixture**	ERC2
Worker		
CS 2	**Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions**	PROC1
CS 3	**Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions**	PROC2
CS 4	**Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition**	PROC3
CS 5	**Chemical production where opportunity for exposure arises**	PROC4
CS 6	**Mixing or blending in batch processes**	PROC5
CS 7	**Transfer of substance or mixture (charging/discharging) at non dedicated-facilities**	PROC8a
CS 8	**Transfer of substance or mixture (charging/discharging) at dedicated facilities**	PROC8b
CS 9	**Transfer of substance or mixture into small containers (dedicated filling line, including weighing)**	PROC9
CS 10	**Tabletting, compression, extrusion, pelettisation, granulation**	PROC14
CS 11	**Use as laboratory reagent**	PROC15

2.2. Conditions of use affecting exposure

2.2.1. Control of environmental exposure: Formulation into mixture (ERC2)

Product (article) characteristics		
Physical form of product	:	Liquid

Amount used (or contained in articles), frequency and duration of use/exposure		
Daily amount per site	:	234666 kg
Release type	:	Continuous release
Emission days	:	225
Conditions and measures related to sewage treatment plant		
STP type	:	Onsite sewage treatment plant
STP type	:	Municipal Sewage Treatment Plant
Conditions and measures related to treatment of waste (including article waste)		
Waste treatment	:	Dispose of waste product or used containers according to local regulations. Hazardous waste incineration
Other conditions affecting environmental exposure		
Local freshwater dilution factor	:	10
Local marine water dilution factor	:	100
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Site should have a spill plan to ensure that adequate safeguards are in place to minimize the impact of episodic releases. Vapour recovery (e.g. adsorption) When not in use, keep containers tightly closed. Prevent leaks and prevent soil / water pollution caused by leaks.		

2.2.2. 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
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		

No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

2.2.3. 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
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

2.2.4. 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)

Product (article) characteristics		
Covers concentrations up to 100 %		

Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

2.2.5. 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
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		

Assumes a good basic standard of occupational hygiene is implemented

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

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

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

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		

No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

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

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

2.2.9. 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 100 %		
Physical form of product	:	Liquid

Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

2.2.10. Control of worker exposure: Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

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

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

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		CEPE SPERC 2.1b.v1
Water		CEPE SPERC 2.1b.v1
Air		CEPE SPERC 2.1b.v1

Protection Target	Exposure estimate	RCR
Freshwater	0,0022 mg/L	0,004
Freshwater sediment	0,011 mg/kg dry weight	0,004
Marine water	0,0004 mg/L	0,006
Marine sediment	0,00202 mg/kg dry weight	0,006
Soil	0,00127 mg/kg dry weight	0,010

2.3.2. 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 estimate	RCR
inhalative	systemic	long-term	0,06 mg/m³ (ECETOC TRA worker v2.0)	
dermal	systemic	long-term	0,34 mg/kg bw/day	

2.3.3. 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 estimate	RCR
inhalative	systemic	long-term	5,51 mg/m³ (ECETOC TRA worker v2.0)	0,02
dermal	systemic	long-term	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes				0,03

2.3.4. 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 estimate	RCR
inhalative	systemic	long-term	16,53 mg/m³ (ECETOC TRA worker v2.0)	0,06
dermal	systemic	long-term	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	
combined routes				0,06

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

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	27,54 mg/m³ (ECETOC TRA	0,10

			worker v2.0)	
dermal	systemic	long-term	6,86 mg/kg bw/day (ECETOC TRA worker v2.0)	0,04
combined routes				0,14

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

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	27,54 mg/m³ (ECETOC TRA worker v2.0)	0,70
dermal	systemic	long-term	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,09
combined routes				0,79

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

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	55,08 mg/m³ (ECETOC TRA worker v2.0)	0,20
dermal	systemic	long-term	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,09
combined routes				0,29

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

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	27,54 mg/m³ (ECETOC TRA worker v2.0)	0,10
dermal	systemic	long-term	6,86 mg/kg bw/day (ECETOC TRA worker v2.0)	0,04
combined routes				0,14

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

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	27,54 mg/m³ (ECETOC TRA worker v2.0)	0,10
dermal	systemic	long-term	6,86 mg/kg bw/day (ECETOC TRA worker v2.0)	0,04
combined routes				0,14

2.3.10. Worker exposure: Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	27,54 mg/m³ (ECETOC TRA worker v2.0)	0,10
dermal	systemic	long-term	3,43 mg/kg bw/day (ECETOC TRA worker v2.0)	0,02
combined routes				0,12

2.3.11. Worker exposure: Use as laboratory reagent (PROC15)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	27,54 mg/m³ (ECETOC TRA worker v2.0)	0,10
dermal	systemic	long-term	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	
combined routes				0,10

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

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.

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.

ES 3: Use in coatings; Industrial uses (SU3).

3.1. Title section

Exposure Scenario name	:	Use in coatings
Structured Short Title	:	Use in coatings; Industrial uses (SU3).

Environment		
CS 1	**Use of non-reactive processing aid at industrial site (no inclusion into or onto article)**	ERC4
Worker		
CS 2	**Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions**	PROC1
CS 3	**Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions**	PROC2
CS 4	**Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition**	PROC3
CS 5	**Chemical production where opportunity for exposure arises**	PROC4
CS 6	**Mixing or blending in batch processes**	PROC5
CS 7	**Industrial spraying**	PROC7
CS 8	**Industrial spraying**	PROC7
CS 9	**Transfer of substance or mixture (charging/discharging) at non dedicated-facilities**	PROC8a
CS 10	**Transfer of substance or mixture (charging/discharging) at dedicated facilities**	PROC8b
CS 11	**Transfer of substance or mixture into small containers (dedicated filling line, including weighing)**	PROC9
CS 12	**Roller application or brushing**	PROC10
CS 13	**Treatment of articles by dipping and pouring**	PROC13
CS 14	**Tabletting, compression, extrusion, pelettisation, granulation**	PROC14
CS 15	**Use as laboratory reagent**	PROC15

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)

Product (article) characteristics		
Physical form of product	:	Liquid
Amount used (or contained in articles), frequency and duration of use/exposure		
Daily amount per site	:	36000 kg
Release type	:	Continuous release
Emission days	:	300
Technical and organisational conditions and measures		
Treat air emissions. Air - minimum efficiency of 98 %		
Conditions and measures related to sewage treatment plant		
STP type	:	Municipal sewage treatment plant
STP type	:	Onsite Sewage Treatment Plant
Conditions and measures related to treatment of waste (including article waste)		
Waste treatment	:	Hazardous waste incineration External treatment and disposal of waste should comply with applicable local and/or national regulations. External recovery and recycling of waste should comply with applicable local and/or national regulations.
Other conditions affecting environmental exposure		
Local freshwater dilution factor	:	10
Local marine water dilution factor	:	100
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Site should have a spill plan to ensure that adequate safeguards are in place to minimize the impact of episodic releases. Vapour recovery (e.g. adsorption) When not in use, keep containers tightly closed.		

3.2.2. 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
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

3.2.3. 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
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		

Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

3.2.4. 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)

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

3.2.5. 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
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

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

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

3.2.7. Control of worker exposure: Industrial spraying (PROC7)

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Carry out in a vented booth or extracted enclosure.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

3.2.8. Control of worker exposure: Industrial spraying (PROC7)

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Conditions and measures related to personal protection, hygiene and health evaluation		
Wear a respirator conforming to EN140.		
Other conditions affecting workers exposure		

Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

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

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

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

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C

Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

3.2.11. 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 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

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

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

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

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply
Assumes a good basic standard of occupational hygiene is implemented

3.2.14. Control of worker exposure: Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

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

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours

Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

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)

Protection Target	Exposure estimate	RCR
Freshwater	0,002 mg/L	
Freshwater sediment	0,012 mg/kg dry weight	
Marine water	0,0004 mg/L	
Marine sediment	0,0020 mg/kg dry weight	
Soil	0,00124 mg/kg dry weight	

3.3.2. 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 estimate	RCR
inhalative	systemic	long-term	0,06 mg/m³ (ECETOC TRA worker v2.0)	
dermal	systemic	long-term	0,34 mg/kg bw/day	

3.3.3. 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 estimate	RCR
inhalative	systemic	long-term	5,51 mg/m³ (ECETOC TRA worker v2.0)	0,02
dermal	systemic	long-term	1,37 mg/kg bw/day	0,01

			(ECETOC TRA worker v2.0)	
combined routes				0,03

3.3.4. 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 estimate	RCR
inhalative	systemic	long-term	16,53 mg/m³ (ECETOC TRA worker v2.0)	0,06
dermal	systemic	long-term	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	
combined routes				0,06

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

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	27,54 mg/m³ (ECETOC TRA worker v2.0)	0,10
dermal	systemic	long-term	6,86 mg/kg bw/day (ECETOC TRA worker v2.0)	0,04
combined routes				0,14

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

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	27,54 mg/m³ (ECETOC TRA worker v2.0)	0,10
dermal	systemic	long-term	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,09
combined routes				0,19

3.3.7. Worker exposure: Industrial spraying (PROC7)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	27,54 mg/m³ (ECETOC TRA worker v2.0)	0,10
dermal	systemic	long-term	2,14 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes				0,11

3.3.8. Worker exposure: Industrial spraying (PROC7)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	55,08 mg/m³ (ECETOC TRA worker v2.0)	0,20
dermal	systemic	long-term	42,86 mg/kg bw/day (ECETOC TRA worker v2.0)	0,28
combined routes				0,48

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

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	55,08 mg/m³ (ECETOC TRA worker v2.0)	0,20
dermal	systemic	long-term	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,09
combined routes				0,29

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

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	27,54 mg/m³	0,10

			(ECETOC TRA worker v2.0)	
dermal	systemic	long-term	6,86 mg/kg bw/day (ECETOC TRA worker v2.0)	0,04
combined routes				0,14

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

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	27,54 mg/m³ (ECETOC TRA worker v2.0)	0,10
dermal	systemic	long-term	6,86 mg/kg bw/day (ECETOC TRA worker v2.0)	0,04
combined routes				0,14

3.3.12. Worker exposure: Roller application or brushing (PROC10)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	55,08 mg/m³ (ECETOC TRA worker v2.0)	0,20
dermal	systemic	long-term	27,43 mg/kg bw/day (ECETOC TRA worker v2.0)	0,18
combined routes				0,38

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

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	55,08 mg/m³ (ECETOC TRA worker v2.0)	0,20
dermal	systemic	long-term	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,09
combined routes				0,29

3.3.14. Worker exposure: Tabletting, compression, extrusion, pelettisation, granulation (PROC14)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	27,54 mg/m³ (ECETOC TRA worker v2.0)	0,10
dermal	systemic	long-term	3,43 mg/kg bw/day (ECETOC TRA worker v2.0)	0,02
combined routes				0,12

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

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	27,54 mg/m³ (ECETOC TRA worker v2.0)	0,10
dermal	systemic	long-term	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	
combined routes				0,10

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

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.

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.

ES 4: Use in coatings; Professional uses (SU22).

4.1. Title section

Exposure Scenario name	:	Use in coatings
Structured Short Title	:	Use in coatings; Professional uses (SU22).

Environment		
CS 1	**Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)**	ERC8a
Worker		
CS 2	**Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions**	PROC1
CS 3	**Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions**	PROC2
CS 4	**Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition**	PROC3
CS 5	**Chemical production where opportunity for exposure arises**	PROC4
CS 6	**Mixing or blending in batch processes**	PROC5
CS 7	**Mixing or blending in batch processes**	PROC5
CS 8	**Transfer of substance or mixture (charging/discharging) at non dedicated-facilities**	PROC8a
CS 9	**Transfer of substance or mixture (charging/discharging) at dedicated facilities**	PROC8b
CS 10	**Non-industrial spraying**	PROC11
CS 11	**Roller application or brushing**	PROC10
CS 12	**Non-industrial spraying**	PROC11
CS 13	**Treatment of articles by dipping and pouring**	PROC13
CS 14	**Use as laboratory reagent**	PROC15
CS 15	**Manual activities involving hand contact**	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)

Product (article) characteristics		
Physical form of product	:	Liquid
Amount used (or contained in articles), frequency and duration of use/exposure		
Daily amount per site	:	5000 kg
Release type	:	Continuous release
Emission days	:	365
Conditions and measures related to sewage treatment plant		
STP type	:	Municipal sewage treatment plant
STP type	:	Onsite Sewage Treatment Plant
Conditions and measures related to treatment of waste (including article waste)		
Waste treatment	:	Hazardous waste incineration External treatment and disposal of waste should comply with applicable local and/or national regulations. External recovery and recycling of waste should comply with applicable local and/or national regulations.
Other conditions affecting environmental exposure		
Local freshwater dilution factor	:	10
Local marine water dilution factor	:	100

4.2.2. 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
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		

Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

4.2.3. 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
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

4.2.4. 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)

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid

Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

4.2.5. 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
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

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

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

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

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Ensure operation is undertaken outdoors.		
Other conditions affecting workers exposure		

Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

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

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

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

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C

Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

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

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Carry out in a vented booth or extracted enclosure.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

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

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

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

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Conditions and measures related to personal protection, hygiene and health evaluation		
Wear a respirator conforming to EN140.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply
Assumes a good basic standard of occupational hygiene is implemented

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

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

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

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours

Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

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

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Wear suitable gloves tested to EN374.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

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)

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

Protection Target	Exposure estimate	RCR
Freshwater	0,003 mg/L	0,004
Freshwater sediment	0,014 mg/kg dry weight	0,004
Marine water	0,0004 mg/L	0,007
Marine sediment	0,002 mg/kg dry weight	0,007
Soil	0,001 mg/kg dry weight	0,004

4.3.2. 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 estimate	RCR
inhalative	systemic	long-term	0,06 mg/m³ (ECETOC TRA worker v2.0)	
dermal	systemic	long-term	0,34 mg/kg bw/day	

4.3.3. 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 estimate	RCR
inhalative	systemic	long-term	27,54 mg/m³ (ECETOC TRA worker v2.0)	0,10
dermal	systemic	long-term	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes				0,11

4.3.4. 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 estimate	RCR
inhalative	systemic	long-term	16,53 mg/m³ (ECETOC TRA worker v2.0)	0,06

dermal	systemic	long-term	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	
combined routes				0,06

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

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	55,08 mg/m³ (ECETOC TRA worker v2.0)	0,20
dermal	systemic	long-term	6,86 mg/kg bw/day (ECETOC TRA worker v2.0)	0,04
combined routes				0,24

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

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	55,08 mg/m³ (ECETOC TRA worker v2.0)	0,20
dermal	systemic	long-term	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,09
combined routes				0,29

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

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	55,08 mg/m³ (ECETOC TRA worker v2.0)	0,20
dermal	systemic	long-term	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,09
combined routes				0,29

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

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	137,71 mg/m³ (ECETOC TRA worker v2.0)	0,50
dermal	systemic	long-term	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,09
combined routes				0,59

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

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	55,08 mg/m³ (ECETOC TRA worker v2.0)	0,20
dermal	systemic	long-term	6,86 mg/kg bw/day (ECETOC TRA worker v2.0)	0,04
combined routes				0,24

4.3.10. Worker exposure: Non-industrial spraying (PROC11)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	27,54 mg/m³ (ECETOC TRA worker v2.0)	0,10
dermal	systemic	long-term	2,14 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes				0,11

4.3.11. Worker exposure: Roller application or brushing (PROC10)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	137,71 mg/m³	0,50

			(ECETOC TRA worker v2.0)	
dermal	systemic	long-term	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,18
combined routes				0,68

4.3.12. Worker exposure: Non-industrial spraying (PROC11)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	55,08 mg/m³ (ECETOC TRA worker v2.0)	0,20
dermal	systemic	long-term	107,14 mg/kg bw/day (ECETOC TRA worker v2.0)	0,70
combined routes				0,90

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

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	55,08 mg/m³ (ECETOC TRA worker v2.0)	0,20
dermal	systemic	long-term	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,09
combined routes				0,29

4.3.14. Worker exposure: Use as laboratory reagent (PROC15)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	55,08 mg/m³ (ECETOC TRA worker v2.0)	0,20
dermal	systemic	long-term	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,09
combined routes				0,29

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

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	137,71 mg/m³ (ECETOC TRA worker v2.0)	0,50
dermal	systemic	long-term	28,29 mg/kg bw/day (ECETOC TRA worker v2.0)	0,18
combined routes				0,69

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

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.

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.

ES 5: Cleaning; Industrial uses (SU3).

5.1. Title section

Exposure Scenario name	:	Cleaning
Structured Short Title	:	Cleaning; Industrial uses (SU3).

Environment		
CS 1	**Use of non-reactive processing aid at industrial site (no inclusion into or onto article)**	ERC4
Worker		
CS 2	**Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions**	PROC1
CS 3	**Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions**	PROC2
CS 4	**Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition**	PROC3
CS 5	**Chemical production where opportunity for exposure arises**	PROC4
CS 6	**Industrial spraying**	PROC7
CS 7	**Transfer of substance or mixture (charging/discharging) at non dedicated-facilities**	PROC8a
CS 8	**Roller application or brushing**	PROC10
CS 9	**Treatment of articles by dipping and pouring**	PROC13

5.2. Conditions of use affecting exposure

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

Product (article) characteristics		
Physical form of product	:	Liquid
Amount used (or contained in articles), frequency and duration of use/exposure		
Daily amount per site	:	5000 kg
Release type	:	Continuous release

Emission days	:	20
Conditions and measures related to sewage treatment plant		
STP type	:	Municipal sewage treatment plant
STP type	:	Onsite Sewage Treatment Plant
Conditions and measures related to treatment of waste (including article waste)		
Waste treatment	:	Hazardous waste incineration External treatment and disposal of waste should comply with applicable local and/or national regulations.
Other conditions affecting environmental exposure		
Local freshwater dilution factor	:	10
Local marine water dilution factor	:	100
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Site should have a spill plan to ensure that adequate safeguards are in place to minimize the impact of episodic releases. Vapour recovery (e.g. adsorption) When not in use, keep containers tightly closed.		

5.2.2. 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
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.

Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply
Assumes a good basic standard of occupational hygiene is implemented

5.2.3. 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
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

5.2.4. 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)

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C

Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

5.2.5. 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
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

5.2.6. Control of worker exposure: Industrial spraying (PROC7)

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Exposure duration 240 min
Technical and organisational conditions and measures		
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).		
Conditions and measures related to personal protection, hygiene and health evaluation		
Wear suitable gloves tested to EN374.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

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

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		

Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

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

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

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

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C

Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

5.3. Exposure estimation and reference to its source

5.3.1. 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

Protection Target	Exposure estimate	RCR
Freshwater	0,0024 mg/L	0,009
Freshwater sediment	0,0277 mg/kg dry weight	0,009
Marine water	0,0004 mg/L	0,011
Marine sediment	0,0037 mg/kg dry weight	0,011
Soil	0,001 mg/kg dry weight	0,004

5.3.2. 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 estimate	RCR
inhalative	systemic	long-term	0,06 mg/m³ (ECETOC TRA	

			worker v2.0)	
dermal	systemic	long-term	0,34 mg/kg bw/day	

5.3.3. 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 estimate	RCR
inhalative	systemic	long-term	5,51 mg/m³ (ECETOC TRA worker v2.0)	0,02
dermal	systemic	long-term	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes				0,03

5.3.4. 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 estimate	RCR
inhalative	systemic	long-term	16,53 mg/m³ (ECETOC TRA worker v2.0)	0,06
dermal	systemic	long-term	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	
combined routes				0,06

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

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	27,54 mg/m³ (ECETOC TRA worker v2.0)	0,10
dermal	systemic	long-term	6,86 mg/kg bw/day (ECETOC TRA worker v2.0)	0,04
combined routes				0,14

5.3.6. Worker exposure: Industrial spraying (PROC7)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	231,35 mg/m³ (ECETOC TRA worker v2.0)	0,84
dermal	systemic	long-term	8,57 mg/kg bw/day (ECETOC TRA worker v2.0)	0,06
combined routes				0,90

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

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	55,08 mg/m³ (ECETOC TRA worker v2.0)	0,20
dermal	systemic	long-term	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,09
combined routes				0,29

5.3.8. Worker exposure: Roller application or brushing (PROC10)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	55,08 mg/m³ (ECETOC TRA worker v2.0)	0,20
dermal	systemic	long-term	27,43 mg/kg bw/day (ECETOC TRA worker v2.0)	0,18
combined routes				0,38

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

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	55,08 mg/m³ (ECETOC TRA	0,20

			worker v2.0)	
dermal	systemic	long-term	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,09
combined routes				0,29

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

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.

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.

ES 6: Cleaning; Professional uses (SU22).

6.1. Title section

Exposure Scenario name	:	Cleaning
Structured Short Title	:	Cleaning; Professional uses (SU22).

Environment		
CS 1	**Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)**	ERC8a
Worker		
CS 2	**Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions**	PROC1
CS 3	**Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions**	PROC2
CS 4	**Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition**	PROC3
CS 5	**Chemical production where opportunity for exposure arises**	PROC4
CS 6	**Transfer of substance or mixture (charging/discharging) at non dedicated-facilities**	PROC8a
CS 7	**Roller application or brushing**	PROC10
CS 8	**Treatment of articles by dipping and pouring**	PROC13
CS 9	**Non-industrial spraying**	PROC11
CS 10	**Non-industrial spraying**	PROC11

6.2. Conditions of use affecting exposure

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

Product (article) characteristics		
Physical form of product	:	Liquid
Amount used (or contained in articles), frequency and duration of use/exposure		
Daily amount per site	:	5000 kg

Release type	:	Continuous release
Emission days	:	20
Conditions and measures related to sewage treatment plant		
STP type	:	Municipal sewage treatment plant
STP type	:	Onsite Sewage Treatment Plant
Conditions and measures related to treatment of waste (including article waste)		
Waste treatment	:	Hazardous waste incineration External treatment and disposal of waste should comply with applicable local and/or national regulations.
Other conditions affecting environmental exposure		
Local freshwater dilution factor	:	10
Local marine water dilution factor	:	100
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Site should have a spill plan to ensure that adequate safeguards are in place to minimize the impact of episodic releases. Vapour recovery (e.g. adsorption) When not in use, keep containers tightly closed.		

6.2.2. 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
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		

Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

6.2.3. 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
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

6.2.4. 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)

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa

Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

6.2.5. 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
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

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

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Ensure operation is undertaken outdoors.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

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

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		

Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

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

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
No other specific measures identified.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

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

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		

Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Provide a good standard of controlled ventilation (10 to 15 air changes per hour).		
Conditions and measures related to personal protection, hygiene and health evaluation		
Wear suitable gloves tested to EN374.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		
Assumes a good basic standard of occupational hygiene is implemented		

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

Product (article) characteristics		
Covers concentrations up to 100 %		
Physical form of product	:	Liquid
Vapour pressure	:	0,5 kPa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration	:	Covers daily exposures up to 8 hours
Technical and organisational conditions and measures		
Ensure operation is undertaken outdoors.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Wear suitable gloves tested to EN374.		
Other conditions affecting workers exposure		
Temperature	:	Assumes use at not more than 20°C above ambient temperature.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply		

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: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC8a)

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

Protection Target	Exposure estimate	RCR
Freshwater	0,0022 mg/L	0,004
Freshwater sediment	0,0114 mg/kg dry weight	0,004
Marine water	0,0004 mg/L	0,006
Marine sediment	0,0020 mg/kg dry weight	0,006
Soil	0,001 mg/kg dry weight	0,003

6.3.2. 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 estimate	RCR
inhalative	systemic	long-term	0,06 mg/m³ (ECETOC TRA worker v2.0)	
dermal	systemic	long-term	0,34 mg/kg bw/day	

6.3.3. 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 estimate	RCR
inhalative	systemic	long-term	27,54 mg/m³ (ECETOC TRA worker v2.0)	0,10
dermal	systemic	long-term	0,34 mg/kg bw/day (ECETOC TRA	0,01

			worker v2.0)	
combined routes				0,11

6.3.4. 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 estimate	RCR
inhalative	systemic	long-term	16,53 mg/m³ (ECETOC TRA worker v2.0)	0,06
dermal	systemic	long-term	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	
combined routes				0,06

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

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	55,08 mg/m³ (ECETOC TRA worker v2.0)	0,20
dermal	systemic	long-term	6,86 mg/kg bw/day (ECETOC TRA worker v2.0)	0,04
combined routes				0,24

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

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	96,40 mg/m³ (ECETOC TRA worker v2.0)	0,35
dermal	systemic	long-term	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,09
combined routes				0,44

6.3.7. Worker exposure: Roller application or brushing (PROC10)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	137,71 mg/m³ (ECETOC TRA worker v2.0)	0,50
dermal	systemic	long-term	27,43 mg/kg bw/day (ECETOC TRA worker v2.0)	0,18
combined routes				0,68

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

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	55,08 mg/m³ (ECETOC TRA worker v2.0)	0,20
dermal	systemic	long-term	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,09
combined routes				0,29

6.3.9. Worker exposure: Non-industrial spraying (PROC11)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	165,25 mg/m³ (ECETOC TRA worker v2.0)	0,60
dermal	systemic	long-term	21,43 mg/kg bw/day (ECETOC TRA worker v2.0)	0,14
combined routes				0,74

6.3.10. Worker exposure: Non-industrial spraying (PROC11)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	231,35 mg/m³ (ECETOC TRA worker v2.0)	0,84

dermal	systemic	long-term	21,43 mg/kg bw/day (ECETOC TRA worker v2.0)	0,14
combined routes				0,98

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

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.

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.

ES 7: Use in coatings; Consumer uses (SU21).

7.1. Title section

Exposure Scenario name	:	Use in coatings
Structured Short Title	:	Use in coatings; Consumer uses (SU21).

Environment		
CS 1	**Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)**	ERC8a
Consumer		
CS 2	Coatings and paints, thinners, paint removers	PC9a
CS 3	Ink and toners	PC18

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)

Product (article) characteristics		
Physical form of product	:	Liquid
Amount used (or contained in articles), frequency and duration of use/exposure		
Daily amount per site	:	0,52 kg
Release type	:	Continuous release
Emission days	:	365
Conditions and measures related to treatment of waste (including article waste)		
Waste treatment	:	External treatment and disposal of waste should comply with applicable local and/or national regulations.
Other conditions affecting environmental exposure		
Local freshwater dilution factor	:	10
Local marine water dilution factor	:	100

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

Product (article) characteristics		
Covers concentrations up to 10 %		
Physical form of product	:	Liquid
Vapour pressure	:	10 Pa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Amount used per event	:	10 kg
Duration	:	132 min
Use frequency	:	1 uses per day
Other conditions affecting consumers exposure		
Room size	:	20 m3
Ventilation rate	:	Covers use under typical household ventilation.

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

Product (article) characteristics		
Covers concentrations up to 10 %		
Physical form of product	:	Liquid
Vapour pressure	:	10 Pa
Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Amount used per event	:	0,04 kg
Duration	:	30 min
Other conditions affecting consumers exposure		
Room size	:	20 m3
Ventilation rate	:	Covers use under typical household ventilation.

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)

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

Protection Target	Exposure estimate	RCR
Freshwater	0,0023 mg/L	0,004
Freshwater sediment	0,0116 mg/kg dry weight	0,004
Marine water	0,0004 mg/L	0,007
Marine sediment	0,0021 mg/kg dry weight	0,007
Soil	0,001 mg/kg dry weight	0,003

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

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	6,83 mg/m³	0,60
dermal	systemic	long-term	6 mg/kg bw/day	0,11
combined routes				0,70

7.3.3. Consumer exposure: Ink and toners (PC18)

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	0,181 mg/m³	0,02
dermal	systemic	long-term	7,5 mg/kg bw/day	0,14
combined routes				0,16

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

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.

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.

ES 8: Cleaning; Consumer uses (SU21).

8.1. Title section

Exposure Scenario name	:	Cleaning
Structured Short Title	:	Cleaning; Consumer uses (SU21).

Environment		
CS 1	**Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)**	ERC8a
Consumer		
CS 2	Washing and cleaning products	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)

Product (article) characteristics		
Physical form of product	:	Liquid
Amount used (or contained in articles), frequency and duration of use/exposure		
Daily amount per site	:	0,27 kg
Emission days	:	365
Other conditions affecting environmental exposure		
Local freshwater dilution factor	:	10
Local marine water dilution factor	:	100

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

Product (article) characteristics		
Covers concentrations up to 10 %		
Physical form of product	:	Liquid
Vapour pressure	:	10 Pa

Temperature	:	20 °C
Amount used (or contained in articles), frequency and duration of use/exposure		
Amount used per event	:	0,016 kg
Duration	:	60 min
Other conditions affecting consumers exposure		
Room size	:	15 m3
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)

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

Protection Target	Exposure estimate	RCR
Freshwater	0,0022 mg/L	0,004
Freshwater sediment	0,011 mg/kg dry weight	0,004
Marine water	0,00039 mg/L	0,006
Marine sediment	0,0020 mg/kg dry weight	0,006
Soil	0,001 mg/kg dry weight	0,003

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

Exposure route	Health effect	Exposure indicator	Exposure estimate	RCR
inhalative	systemic	long-term	0,181 mg/m³	0,02
dermal	systemic	long-term	7,5 mg/kg bw/day	0,14
combined routes				0,16

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

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.

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.