SAFETY DATA SHEET

Annex II

Exposure scenario

Substance Name: 2,2'-oxydiethanol

EC Number: 203-872-2

CAS Number: 111-46-6

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1. EXPOSURE ASSESSMENT

General remarks

Environment

In the chemical safety assessment performed according to Article 14(3) in connection with Annex I section 3 (Environmental Hazard Assessment) and section 4 (PBT/ vPvB Assessment) no hazard was identified. Also, according to Annex VI of Directive 67/548/EEC, there is no environmental classification for diethylene glycol. Article 14 (4) of REACH, however, establishes that exposure assessment and risk characterisation according to Annex I are to be carried out in the CSA/CSR for substances (> 10 mt/y), classified as hazardous or as PBT/vPvB. Annex I, section 5.0 requires to cover any exposure that may relate to the "hazards identified" in the hazard assessment (section 1 to 4). The hazards addressed in Annex I are not limited to hazards that lead to a classification under CLP (see Guidance Document A, footnote 7).

The aquatic toxicity of the five short chain ethylene glycols (mono-, di-, tri-, tetra- and pentaethylene glycol) were evaluated as a single category. Data on the acute toxicity are available for all three trophic levels (fish, aquatic invertebrates and algae). In the majority of tests no effect was observed, even at concentrations beyond 100 mg/L. All the available data indicate that the members of the category should exhibit low toxicity. Therefore all category members can be evaluated as not harmful to aquatic life.

In addition, diethylene glycol has a low Kow of 0.0339, is not expected to bioaccumulate, and is readily biodegradable. Thus, environmental classification of diethylene glycol for acute or chronic aquatic hazards is not indicated.

The environmental assessment was performed using the latest available version of ECETOC TRA. Each scenario was assessed using an Environmental Release Category (ERC) in a Tier I assessment. If the assessment resulted in a risk characterisation ratio greater than 1.0, then a Specific Environmental Release Category (SpERC) approach was used in the ECETOC TRA tool.

Tonnages used in the estimation of exposures and risks represent industry-wide tonnages or maximum passing tonnages for the sake of conservatism. Tonnages of 200,000 per year have their basis in manufacturing volume, where the value of 200,000 tonnes represents an estimate of the industry-wide use of diethylene glycol in the manufacture of polymers. This was the worst case tonnage of any use; therefore, utilizing this tonnage results in a conservative assessment for all uses. Tonnages other than 200,000 tonnes per year represent the maximum tonnage that would pass (referred to as the "maximum passing tonnage") for a particular scenario, as determined using the latest version of ECETOC TRA available at the time of this assessment. This approach leads to a worst case assessment since actual tonnages are expected to be much lower than the values used in the assessment.

<u>Human health – Worker</u>

Short-term exposure: 2,2'-oxydiethanol is not classified regarding acute inhalative or dermal toxicity.

Thus, short-term exposure (peak exposure) has not been assessed.

Exposure estimation for PROCs using the ECETOC TRA worker v2.0:

In case the ECETOC TRA worker v2.0 has been used for the calculation of PROCs the following modifications has been applied:

LEV: The LEV exposure modifying factors for dermal exposure implemented

in the

ECETOC TRA v2.0 are not considered

Gloves: Implemented as an additional RMM. The following effectiveness

values are assumed: Use of suitable gloves: 80%; Use of suitable gloves in combination with basic employee training: 90%; Use of suitable gloves in combination with specific activity training: 95%; Use of suitable gloves in combination with intensive management

supervision controls: 98%

Short description of all exposure scenarios

Table 1: Short description of all exposure scenarios with their use descriptors and life cycle stage

		PC)	Life	cycle	stage	covei	red by	ES		category	(C)	release
	Short description of	gory (End	use			(SU)	cate	ory (A	
Number (ES)	exposure scenario	Product Category (PC)	Manufacture	Formulation	Industrial	Professional	Consumer	Service Life	Sector of use (SU)	Process (PROC)	Article Category (AC)	Environmental category (ERC)
1	Manufacturing of substance				X				3	1, 2, 3, 4, 8a, 8b, 15		1
2	Use as Intermediate				X				3	1, 2, 3, 4, 5, 8a, 8b, 9,		6a
3	Use as Process chemical				X				3	1, 2, 3,		4

		PC)	Life	cycle	stage	cove	red by	y ES		gory	(C)	release
	Short description of	gory (End	use			(ac)	category	ory (A	
Number (ES)	exposure scenario	Product Category (PC)	Manufacture	Formulation	Industrial	Professional	Consumer	Service Life	Sector of use (SU)	Process (PROC)	Article Category (AC)	Environmental category (ERC)
										4, 5, 8a, 8b, 9, 13, 14,		
4	Distribution of substance				X				3	1, 2, 3, 4, 8a, 8b, 9,		1
5	Formulation and (re)packing of substances and mixtures				X				3	1, 2, 3, 4, 5, 8a, 8b, 9, 14, 15		2
6	Production of polymers				X				3	1, 2, 3, 4, 5, 6, 8a, 8b, 9, 15		6c
7	Use in Paints/ Coatings				X				3	1,		4

		PC)	Life	cycle	stage	cove	red by	y ES		category	(C)	release
	Short description of	gory (End	End use			(SU)	cate		
Number (ES)	exposure scenario	Product Category (PC)	Manufacture	Formulation	Industrial	Professional	Consumer	Service Life	Sector of use (SU)	Process (PROC)	Article Category (AC)	Environmental category (ERC)
	(industrial)									2, 3, 4, 5, 7, 8a, 8b, 10, 13,		
8	Use in Paints/ Coatings /Adhesives/ Sealants/ Foams/ Polymers / filled Polymers (professional)					X			22	1, 2, 3, 4, 5, 8a, 8b, 9, 10, 11, 13, 14, 15,		8d
9	Use in Paints/ Coatings / Surface treatment products (Consumer use)	9a, 15, 18, 23, 31, 34					X		21			8d
10	Use in Cleaning agents (industrial)				X				3	1, 2, 3, 4, 7, 8a, 8b, 10,		4

		PC)	Life	cycle	stage	cove	red by	y ES		gory	(C)	release
	Short description of	gory (End	use			(SU)	category	ory (A	
Number (ES)	exposure scenario	Product Category (PC)	Manufacture	Formulation	Industrial	Professional	Consumer	Service Life	Sector of use (SU)	Process (PROC)	Article Category (AC)	Environmental category (ERC)
11	Use in Cleaning agents (professional)					X			22	1, 2, 3, 4, 8a, 8b, 10, 11,		8a
12	Use in Cleaning agents (Consumer use)	35					X		21			8a
13	Use in Biocidal products (Consumer use)	8					X		21			8d
14	Use in Lubricants (industrial)				X				3	1, 2, 3, 4, 7, 8a, 8b, 9, 10, 13, 17, 18		4
15	Use in Metal-working fluids (industrial)				X				3	1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 13,		4

		PC)	Life	cycle	stage	cove	red by	y ES		gory	(C)	release
	Short description of	gory (End	use			(as)	category	ory (A	_
Number (ES)	exposure scenario	Product Category (PC)	Manufacture	Formulation	Industrial	Professional	Consumer	Service Life	Sector of use (SU)	Process (PROC)	Article Category (AC)	Environmental category (ERC)
16	Use in Metal-working fluids (professional)					X			22	1, 2, 3, 5, 8a, 8b, 9, 10, 11, 13,		8a
17	Use in/as Functional fluids (industrial)				X				3	1, 2, 3, 4, 8a, 8b, 9		7
18	Use in/as Functional fluids (professional)					X			22	1, 2, 3, 4, 8a, 9, 20		9b
19	Use in Heat transfer and Hydraulic fluids (Consumer)	16, 17					X		21			9b
20	Use in/as De-icing/Anti-icing applications/agents (professional)					X			22	1, 2, 8a, 8b,		8d
21	Use in/as De-icing/Anti-icing applications/agents (Consumer use)	4					X		21			8d

		PC)	Life	cycle	stage	cove	red by	y ES		gory	(C)	release
	Short description of	gory (End	use			(SU)	category	ory (A	
Number (ES)	exposure scenario	Product Category (PC)	Manufacture	Formulation	Industrial	Professional	Consumer	Service Life	Sector of use (SU)	Process (PROC)	Article Category (AC)	Environmental category (ERC)
22	Use in laboratories (industrial and professional)				X	X			3, 22	15		8a
23	Use in Adhesives and Sealants (Consumer)	1					X		21			8c
24	Production of Polymers, filled polymers, foams, coatings, adhesives, sealants				X				3	1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 13, 14, 15		6c
25	Production of rigid foam	32					X		21			8f

1.1 Manufacturing of substance

1.1.1 Exposure Scenario 1

General Remarks

The relevant operational conditions (OCs) used for calculation of environmental exposure are mentioned under paragraph 1.1.2.4.

Table 2: Description of ES 1

Table 2. Description of ES 1	
Reference Number	1
1.1.1.1 Title	
Free short title	Manufacturing of substance
Systematic title based on use descriptor	SU3; PROC 1, 2, 3, 4, 8a, 8b and 15; ERC 1
1.1.1.2 Operational conditions an	nd Risk management measures

1.1.1.2.1Control of workers exposure	e for PROC 1						
Name of contributing scenario	Use in closed process, no likelihood of exposure						
Use descriptor covered	PROC 1						
Annual Made 1	ECETOC TRA Worker	v2.0 with modifications					
Assessment Method	(see 1. General remarks)						
Product characteristic							
Physical state	Liquid						
Fugacity	High						
Concentration of substance	100	%					
Vapour pressure of the substance	257	hPa					
(Vapour pressure corresponds to temper	eratures of ca. 200 °C)						
Amounts used							
Not relevant							
Frequency and duration of use/expo	sure						
Duration of exposure	> 4	hours/day					
Frequency of exposure	≤ 240	days/year					
Human factors not influenced by ris	k management						
Exposed skin surface	Palm of one hand (240 cm ²)						
Other given operational conditions a	ffecting workers exposur	e					
Location	Indoor						
Domain	Industrial						
Technical conditions and measures a	t process level (source) to	prevent release					
None							
Technical conditions and measures worker	to control dispersion f	rom source towards the					
Local exhaust ventilation required N	О						
Organisational measures to prevent	limit releases, dispersion	and exposure					
Not relevant in ECETOC TRA							
Conditions and measures related to	personal protection, hygic	ene and health evaluation					
Respiratory protection required No							
1.1.1.2.2Control of workers exposure	e for PROC 2						
Name of contributing scenario	Use in closed, continuou controlled exposure	us process with occasional					
Use descriptor covered	PROC 2						
Assessment Method	ECETOC TRA Worker	v2.0 with modifications					

		(see 1. Genera	al remarks)				
Product characteristic							
Physical state		liquid					
Fugacity		high					
Concentration of substance		100		%			
Vapour pressure of the substance	e	257		hPa			
(Vapour pressure corresponds to	temper	ratures of ca. 20	00 °C)				
Amounts used							
Not relevant							
Frequency and duration of us	e/exposi	ure					
Duration of exposure		> 4		hours/day			
Frequency of exposure		≤ 240		days/year			
Human factors not influenced	by risk	management					
Exposed skin surface		Palm of both hands (480 cm ²)					
Other given operational condi	tions af	fecting worker	rs exposure	e			
Location		Indoor					
Domain		Industrial					
Technical conditions and measure	sures at	process level	(source) to	prevent release			
None							
Technical conditions and me worker	easures	to control dis	spersion fi	rom source towards the			
Local exhaust ventilation require	ed	Yes		Effectiveness: 90%			
Organisational measures to pr	revent /	limit releases,	dispersion	and exposure			
Not relevant in ECETOC TRA							
Conditions and measures relati	ted to p	ersonal protec	tion, hygie	ene and health evaluation			
Respiratory protection required	No						
1.1.1.2.2.3 Control of workers	exposu	re for PROC 3	and 4				
Workers related free short titl	le	formulation).		process (synthesis) where			
Use descriptor covered		PROC 3 and 4	-				
*		ECETOC TR	A Worker v	v2.0 with modifications			
Assessment Method		(see 1. General remarks)					
Product characteristic		1					

Physical state	Liqu	id				
Fugacity	Low					
Concentration of substance	100 %					
Vapour pressure of the substance	0.00	8	hPa			
Amounts used	"		,			
Not relevant						
Frequency and duration of use/exp	osure					
Duration of exposure	> 4		hours/day			
Frequency of exposure	≤ 24	0	days/year			
Human factors not influenced by r	isk mana	ngement				
Exposed skin surface	Paln	of one hand (24	0 cm ²): PROC 3			
Exposed skill surface	Paln	n of both hands (4	180 cm ²): PROC 4			
Other given operational conditions	s affectin	g workers expos	sure			
Location	Indo	or				
Domain	Indu	strial				
Technical conditions and measures	s at proc	ess level (source)	to prevent release			
None						
Technical conditions and measur worker	es to co	ntrol dispersior	n from source towards the			
Local exhaust ventilation required	No					
Organisational measures to preven	nt /limit ı	eleases, dispersi	on and exposure			
Not relevant in ECETOC TRA						
Conditions and measures related t	o person	al protection, hy	giene and health evaluation			
Respiratory protection required	No					
1.1.1.2.4 Control of workers expos	ure for P	ROC 8a				
Workers related free short title		sfer of su rging/discharging ainers at non-ded				
Use descriptor covered	PRC	C 8a				
Assessment Method	ECE	TOC TRA Work	er v2.0 with modifications			
Assessment Method	(see	1. General remar	ks)			
Product characteristic						
Physical state	Liqu	id				
Fugacity	Low					
Concentration of substance	100		%			
Vapour pressure of the substance	0.00	8	hPa			
Amounts used						
Not relevant						

Europe on a 1 1 2 6 /									
Frequency and duration of use/expo			1 /1						
Duration of exposure	> 4		hours/day						
Frequency of exposure	≤ 240		days/year						
Human factors not influenced by ris									
Exposed skin surface	Both ha	Both hands (960 cm ²)							
Other given operational conditions	affecting v	fecting workers exposure							
Location	Indoor								
Domain	Industr	ial							
Technical conditions and measures	at process	level (source) to	prevent release						
None									
Technical conditions and measure worker	s to cont	rol dispersion fr	om source towards the						
Local exhaust ventilation required \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Yes	Effectiveness 90	%						
In case no LEV is present, a suitable required	respirator	ry protection with	adequate effectiveness is						
Organisational measures to prevent	/limit rel	eases, dispersion	and exposure						
Not relevant in ECETOC TRA									
Conditions and measures related to	personal	protection, hygie	ne and health evaluation						
Respiratory protection required	No								
1.1.1.2.5 Control of workers exposu	re for PRO	OC 8b							
Workers related free short title		er of substang/discharging) hers at dedicated fa	from/to ves-sels/large						
Use descriptor covered	PROC	8b							
	ECETO	OC TRA Worker v	2.0 with modifications						
Assessment Method	(see 1.	General remarks)							
Product characteristic									
Physical state	Liquid								
Fugacity	Low								
Concentration of substance	100		%						
Vapour pressure of the substance	0.008		hPa						
Amounts used									
Amounts used Not relevant									
	osure								
Not relevant	osure > 4		hours/day						
Not relevant Frequency and duration of use/expo			hours/day days/year						
Not relevant Frequency and duration of use/expo Duration of exposure	> 4 ≤ 240	ement	+						
Not relevant Frequency and duration of use/expo Duration of exposure Frequency of exposure	> 4 ≤ 240 sk manage	ement f both hands (480	days/year						

Other given operational conditions affecting workers exposure			
Location	Indoor		
Domain	Industrial		
Technical conditions and measures at	process level (source) to	prevent release	
None			
Technical conditions and measures worker	to control dispersion fi	rom source towards the	
Local exhaust ventilation required No	0		
Organisational measures to prevent /	limit releases, dispersion	and exposure	
Not relevant in ECETOC TRA			
Conditions and measures related to p	ersonal protection, hygie	ene and health evaluation	
Respiratory protection required No	0		
1.1.1.2.6 Control of workers exposure	for PROC 15		
Workers related free short title	or 1 kg present at work	all scale laboratory (< 1 l place). Larger laboratories s should be treated as	
Use descriptor covered	PROC 15		
Assessment Method	ECETOC TRA Worker v2.0 with modifications (see 1. General remarks)		
Product characteristic			
Physical state	Liquid		
Fugacity	Low		
Concentration of substance	100	%	
Vapour pressure of the substance	0.008	hPa	
Amounts used			
Not relevant			
Frequency and duration of use/expos	ure		
Duration of exposure	> 4	hours/day	
Frequency of exposure	≤ 240	days/year	
Human factors not influenced by risk	management		
Exposed skin surface Palm one both hand (240 cm²)			
Other given operational conditions affecting workers exposure			
Location	Indoor		
Domain	Industrial		
Technical conditions and measures at	process level (source) to	prevent release	
None			
Technical conditions and measures worker	to control dispersion fi	rom source towards the	

Local exhaust ventilation required	No			
Organisational measures to prevent /limit releases, dispersion and exposure				
Not relevant in ECETOC TRA				
Conditions and measures related to personal protection, hygiene and health evaluation				
Respiratory protection required	No			

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

Use of tightly fitting safety goggles

(The substance has shown to cause mucosal irritations at relatively high concentrations. Thus, it is recommended to protect the eyes.)

1.1.2 Exposure Estimation

1.1.2.1. Workers exposure

Table 3: Estimated exposure for workers – PROC 1

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Route of exposure	Concentrations		Justification
	Value	Unit	
Long-term exposure, systemic/local, inhalative	0.04	mg/m³	NA
Long-term exposure, systemic, dermal	0.34	mg/kg bw/d	NA

NA = Not applicable

Table 4: Estimated exposure for workers – PROC 2

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Route of exposure	Concentrations		Justification
	Value	Unit	
Long-term exposure, systemic/local, inhalative	22.11	mg/m³	NA
Long-term exposure, systemic, dermal	1.37	mg/kg bw/d	NA

NA = Not applicable

Table 5 Estimated exposure for workers – PROC 3

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Route of exposure	Concentrations		Justification
	Value	Unit	
Long-term exposure, systemic/local, inhalative	13.27	mg/m³	NA
Long-term exposure, systemic, dermal	0.34	mg/kg bw/d	NA

NA = Not applicable

Table 6: Estimated exposure for workers – PROC 4

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Route of exposure	Concentrations		Justification
	Value	Unit	
Long-term exposure, systemic/local, inhalative	22.11	mg/m³	NA
Long-term exposure, systemic, dermal	6.86	mg/kg bw/d	NA

NA = Not applicable

Table 7: Estimated exposure for workers - PROC 8a

Calculation tool used: ÉCETOC TRA v2.0 modified (see 1. General remarks)

Route of exposure	Concentrations		Justification
	Value	Unit	
Long-term exposure, systemic/local, inhalative	4.42	mg/m³	NA
Long-term exposure, systemic, dermal	13.71	mg/kg bw/d	NA

NA = Not applicable

Table 8: Estimated exposure for workers – PROC 8b

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Route of exposure	Concentrations		Justification
	Value	Unit	
Long-term exposure, systemic/local, inhalative	22.11	mg/m³	NA

Long-term exposure, systemic, dermal	6.86	mg/kg bw/d	NA
--------------------------------------	------	------------	----

NA = Not applicable

Table 9: Estimated exposure for workers – PROC 15

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Route of exposure	Concentrations		Justification
	Value	Unit	
Long-term exposure, systemic/local, inhalative	22.11	mg/m³	NA
Long-term exposure, systemic, dermal	0.34	mg/kg bw/d	NA

NA = Not applicable

1.1.2.2. Consumer exposure

Not applicable

1.1.2.3. Indirect exposure of humans via the environment (oral)

The bioaccumulation potential of this substance is very low, with a Kow of 0.0339; therefore, indirect exposure of humans via the environment can be considered negligible.

1.1.2.4. Environmental exposure

Table 10: Environmental Exposure Scenerio ES1-E1

Section 1	Operational conditions and risk management measures
Section 1.2	Control of environmental exposure
Identifier*	ES1-E1
Contributing scenario	Manufacturing Of Substance
Environmental Release Category	ERC1
Specific ERC	ESVOC 1
Assessment scenario	
Operational Conditions	
Amounts used	
Amounts used in the EU (tonnes/year)	26,206
	(maximum passing tonnage)
Fraction of EU tonnage used in region	1
Fraction of main source to local environment	1
Fraction of substance in end-use products	1
Maximum daily site tonnage (kg/day)	87,353

E d d	
Frequency and duration of use	
Type of release	Continuous
Emission days (days/year)	300 - ESVOC 1
Site specific monitoring data results for	
surface water effluent	
Location of sample	
Environmental factors not influenced by	
risk management	
Local freshwater dilution factor	10 (default)
Local marine water dilution factor	100 (default)
Other given operational conditions affecting	g environmental exposure
Risk Management Measures	
Technical conditions and measures at	
process level (source) to prevent release	
Technical onsite conditions and measures	
to reduce or limit discharges, air emissions	
and releases to soil	
Treat air emissions to provide a typical	
removal efficiency of (%)	
Treat wastewater (prior to discharge to	87%
receiving water) to provide the required	0770
removal efficiency of (%)	
removar emergency or (70)	
Organizational measures to prevent/limit	
release from site	
Conditions and measures related to	
municipal sewage treatment plant	
Conditions and measures related to	
external treatment of waste for disposal	
Conditions and measures related to	
external recovery of waste	
Other environmental control measures	
additional to above	
_	ES1-E1
Identifier	
Narrative	Release fraction derived from SpERC (ESVOC 1)
Release fraction to air from process	1.00E-06
Release fraction to wastewater from process	1.00E-02
Release fraction to soil from process	1.00E-04
(regional only)	0.7477.00
Local release to air (kg/d)	8.74E-02
Local release to sewage (kg/d)	8.74E+02

Local release to soil (kg/d)	8.74E+00
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	
Total efficiency of removal from air emissions (%)	
The maximum allowable site tonnage (M_{Safe}) based on removal from domestic sewage treatment (kg/d)	87,354
Scaling	

The downstream user can check the compliance of his site by comparing site specific data with defaults used in the exposure assessment. The site specific quotient should be inferior or equal to the spERC quotient.

$$\frac{m_{\text{spERC}}^{}*(1\text{-}E_{\text{ER,spERC}})*F_{\text{releasespERC}}}{DF_{\text{spERC}}} \! \geq \! \frac{m_{\text{site}}^{}*(1\text{-}E_{\text{ER,site}})*F_{\text{releasesite}}}{DF_{\text{site}}}$$

m_{spERC}: Substance use rate in spERC E_{ER.spERC}: Efficacy of RMM in spERC

F_{release,,spERC}: Initial release fraction in spERC DF_{spERC}: dilution factor of STP effluent in

river

m_{site}: Substance use rate at site E_{ER,site}: Efficacy of RMM at site

F_{release_site}: Initial release fraction at site DF_{site}: dilution factor of STP effluent in river

1.1.2.4.1. Predicted exposure concentrations in the STP and in aquatic compartments (freshwater, seawater and sediment)

Table 11: Predicted exposure concentrations in the STP and in aquatic compartments (freshwater, seawater and sediment)

Local Concentration, Compartment: STP	unit	ES1-E1
and aquatic		
Local PEC in surface water during emission	mg/L	5.529E+00
episode (dissolved)		
Annual average local PEC in surface water	mg/L	4.544E+00
(dissolved)		
Local PEC in fresh water sediment during	mg/kg dwt	2.090E+01
emission episode		
Local PEC in sea water during emission	mg/L	5.529E-01

episode		
Annual average local PEC in sea water	mg/L	4.544E-01
(dissolved)		
Local PEC in marine sediment during	mg/kg dwt	2.090E+00
emission episode		
PEC for microorganisms in STP	mg/L	5.528E+01
Comments		

1.1.2.4.2. Predicted exposure concentration in soils

Table 12: Predicted exposure concentration in soils

Local Concentration, Compartment: soil	unit	ES1-E1
Local PEC in agricultural soil, averaged	mg/kg dwt	1.995E-01
over 30 days		
Local PEC agricultural soil, averaged over	mg/kg dwt	5.291E-02
180 days		
Local PEC in grass land, averaged over 180	mg.kg dwt	1.637E-02
days		
Comments		

1.1.2.4.3. Predicted exposure concentration in the atmospheric compartment

Table 13: Predicted exposure concentration in the atmospheric compartment

Local Concentration, Compartment: air	unit	ES1-E1
Annual average local PEC in air (total)	kg/m ³	1.996E-11
Comments		

1.1.2.4.4. Predicted exposure concentration in food for secondary poisoning

The bioaccumulation potential of this substance is very low, therefore secondary poisoning can be considered negligible. The Kow for DEG is 0.0339.

1.2. Use as Intermediate

1.2.1 Exposure Scenario 2

General Remarks

The relevant OCs used for calculation of environmental exposure are mentioned under paragraph 1.2.2.4.

Table 14: Description of ES 2

Reference Number	2				
1.2.1.1 Title					
Free short title	Use	Use as Intermediate			
Systematic title based on use descriptor	SU3	SU3; PROC 1, 2, 3, 4, 5, 8a, 8b, 9 and 15; ERC 6a			
1.2.1.2 Operational conditions ar	ıd Ri	sk management measures	S		
1.2.1.2.1 Control of workers expe	osure	for PROC 1			
Workers related free short title		Use in closed process, no	likelihood of exposure		
Use descriptor covered		PROC 1			
Processes, tasks, activities covere	red Use of the substance in high integrity contains system where little potential exists for exposure.g. any sampling via closed loop systems		ntial exists for exposures,		
A (N. 1)		ECETOC TRA Worker v2.0 with modifications			
Assessment Method		(see 1. General remarks)			
Product characteristic	Product characteristic				
Physical state	Liquid				
Fugacity		Low			
Concentration of substance		100	%		
Vapour pressure of the substance		0.008	hPa		
Amounts used					
Not relevant					
Frequency and duration of use/e	xposi	ure			
Duration of exposure	> 4 hours/day		hours/day		
Frequency of exposure	≤ 240 days/year		days/year		
Human factors not influenced by	risk	management			
Exposed skin surface	Exposed skin surface Palm of one hand (240 cm²)				
Other given operational conditions affecting workers exposure					
Location	Indoor				
Domain		Industrial			

Technical conditions and me	Technical conditions and measures at process level (source) to prevent release					
None	None					
Technical conditions and m	Technical conditions and measures to control dispersion from source towards the worker					
Local exhaust ventilation required No						
Organisational measures to p	prevent /	limit	releases, dispersion	and exposure		
Not relevant in ECETOC TRA						
Conditions and measures rel	ated to p	erso	nal protection, hygic	ene and health evaluation		
Respiratory protection required	No					
1.2.1.2.2 Control of workers	exposure	for	PROC 2			
Workers related free short ti	itle		e in closed, continuou atrolled exposure	us process with occasional		
Use descriptor covered		PR	OC 2			
Processes, tasks, activities co	vered	philosophy is not specifically aimed at minimizi		cally aimed at minimizing exposure will arise e.g.		
Assessment Method ECETOC TRA Worker v2.0 with modification (see 1. General remarks)						
Product characteristic						
Physical state		Liquid				
Fugacity		Low				
Concentration of substance		100)	%		
Vapour pressure of the substan	nce	0.008		hPa		
Amounts used						
Not relevant						
Frequency and duration of u	se/expos	ure				
Duration of exposure		> 4		hours/day		
Frequency of exposure	Frequency of exposure		40	days/year		
Human factors not influence	d by risk	mai	nagement			
Exposed skin surface Palm of both hands (480 cm ²)						
Other given operational cond	ditions af	fecti	ng workers exposur	e		
Location		Indoor				
Domain		Industrial				
Technical conditions and measures at process level (source) to prevent release						
None						
Technical conditions and m	<u> 1easures</u>	to c	control dispersion f	rom source towards the		

worker			
Local exhaust ventilation required N	Jo .		
Organisational measures to prevent	/limit releases, dispersion and exposure		
Not relevant in ECETOC TRA			
Conditions and measures related to p	personal protection, hygiene and health evaluation		
Respiratory protection required No			
1.2.1.2.3 Control of workers exposur	re for PROC 3 and 4		
	Use in closed batch process (synthesis or		
Workers related free short title	formulation). Use in batch and other process (synthesis) where		
Tin January	opportunity for exposure arises.		
Use descriptor covered	PROC 3 and 4		
Processes, tasks, activities covered	Batch manufacture of a chemical or formulation where the predominant handling is in a contained manner, e.g. through enclosed transfers, but where some opportunity for contact with chemicals occurs, e.g. through sampling		
	Use in batch manufacture of a chemical where significant opportunity for exposure arises, e.g. during charging, sampling or discharge of material, and when the nature of the design is likely to result in exposure.		
	ECETOC TRA Worker v2.0 with modifications		
Assessment Method	(see 1. General remarks)		
For further details on OCs and RMMs see Table 2			
1.2.1.2.4 Control of workers exposure for PROC 5			
Workers related free short title	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact).		
Use descriptor covered	PROC 5		
Processes, tasks, activities covered	Manufacture or formulation of chemical products or articles using technologies related to mixing and blending of solid or liquid materials, and where the process is in stages and provides the opportunity for significant contact at any stage		
Assessment Method	ECETOC TRA Worker v2.0 with modifications (see 1. General remarks)		
Product characteristic			
Physical state	Liquid		
	Low		
Fugacity	LOW		

Vapour pressure of the substar	nce	0.008		hPa	
Amounts used					
Not relevant					
Frequency and duration of u	se/exposi	ure			
Duration of exposure		> 4		hours/day	
Frequency of exposure		≤ 2·	40	days/year	
Human factors not influence	d by risk	mar	nagement		
Exposed skin surface		Pal	m of both hands (480 c	cm²)	
Other given operational cond	ditions af	fecti	ng workers exposure		
Location		Ind	oor		
Domain		Ind	ustrial		
Technical conditions and me	asures at	pro	cess level (source) to	prevent release	
None					
Technical conditions and n worker	ieasures	to c	ontrol dispersion fro	om source towards the	
Local exhaust ventilation requ	ired No)			
Organisational measures to	prevent /l	imit	releases, dispersion a	and exposure	
Not relevant in ECETOC TRA					
Conditions and measures rel	ated to p	erso	nal protection, hygier	ne and health evaluation	
Respiratory protection required	No				
Use of suitable gloves with specific activity training	Yes		Effectiveness: 90%		
1.2.1.2.5 Control of workers	exposure	for	PROC 8a		
Transfer of substance or preparate				from/to vessels/large	
Use descriptor covered		PR	OC 8a		
Processes, tasks, activities covered Sampling, loading, filling, transfer, dumps bagging in non- dedicated facilities. Expos related to dust, vapour, aerosols or spillage, cleaning of equipment to be expected.			ated facilities. Exposure aerosols or spillage, and		
Assessment Method		ECETOC TRA Worker v2.0 with modifications (see 1. General remarks)			
For further details on OCs and RMMs see Table 2					
1.2.1.2.6 Control of workers	exposure	for	PROC 8b and 9		
Workers related free short title		Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities.			
		Transfer of substance or preparation into small			

	containers (dedicated filling line, including weighing)			
Use descriptor covered	PROC 8b and 9			
Processes, tasks, activities covered	Sampling, loading, filling, transfer, dumping, bagging in dedicated facilities. Exposure related to dust, vapour, aerosols or spillage, and cleaning of equipment to be expected.			
	Filling lines specifically designed to both capture vapour and aerosol emissions and minimise spillage			
A	ECETOC TRA Worker v2.0 with modifications			
Assessment Method	(see 1. General remarks)			
For further details on OCs and RMMs see Table 2				
1.2.1.2.7 Control of workers exposure for PROC 15				
Workers related free short title	Use as laboratory reagent			
Use descriptor covered	PROC 15			
Processes, tasks, activities covered	Use of substances at small scale laboratory (< 1 1 or 1 kg present at workplace). Larger laboratories and R+D installations should be treated as industrial processes.			
Assessment Method	ECETOC TRA Worker v2.0 with modifications (see 1. General remarks)			
For further details on OCs and RMMs see Table 2				

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

Use of tightly fitting safety goggles

(The substance has shown to cause mucosal irritations at relatively high concentrations. Thus, it is recommended to protect the eyes)

1.2.2 Exposure Estimation

1.2.2.1. Workers exposure

For the estimated exposure for workers / PROC 3 see Table 5 For the estimated exposure for workers / PROC 4 see Table 6 For the estimated exposure for workers / PROC 8a see Table 7 For the estimated exposure for workers / PROC 8b see Table 8 For the estimated exposure for workers / PROC 15 see Table 9

Table 15: Estimated exposure for workers – PROC 1

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Route of exposure	Concentrations		Justification
	Value Unit		
Long-term exposure, systemic/local, inhalative	0.04	mg/m³	NA
Long-term exposure, systemic, dermal	0.34	mg/kg bw/d	NA

NA = Not applicable

Table 16: Estimated exposure for workers – PROC 2

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Route of exposure	Concentrations		Justification
	Value Unit		
Long-term exposure, systemic/local, inhalative	4.42	mg/m³	NA
Long-term exposure, systemic, dermal	1.37	mg/kg bw/d	NA

NA = Not applicable

Table 17: Estimated exposure for workers – PROC 5

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Route of exposure	Concentrations		Justification
	Value	Unit	
Long-term exposure, systemic/local, inhalative	22.11	mg/m³	NA
Long-term exposure, systemic, dermal	1.37	mg/kg bw/d	NA

NA = Not applicable

Table 18: Estimated exposure for workers – PROC 9

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Route of exposure	Concentrations		Justification
	Value	Unit	
Long-term exposure, systemic/local, inhalative	22.11	mg/m³	NA
Long-term exposure, systemic, dermal	6.86	mg/kg bw/d	NA

NA = Not applicable

1.2.2.2. Consumer exposure

Not applicable

1.2.2.3. Indirect exposure of humans via the environment (oral)

The bioaccumulation potential of this substance is very low, with a Kow of 0.0339; therefore, indirect exposure of humans via the environment can be considered negligible.

9.2.2.4. Environmental exposure

The environmental exposure scenario is evaluated below. Exposure has been estimated using the version of the ECETOC TRA Integrated Tool current at the time of preparation of this document. The environmental assessment was performed using the SpERC ESVOC 2, described as "Use as a isolated intermediate not under strictly controlled conditions" (Cefic SpERC Overview Table, April 2010). Given its description as relating to use as an intermediate, this SpERC was selected as the most appropriate for evaluating this particular exposure scenario.

Table 19: Environmental Exposure Scenario ES2-E1

Section 1	Operational conditions and risk management measures	
Section 1.2	Control of environmental exposure	
Identifier*	ES2-E1	
Contributing scenario	Use As Intermediate	
Environmental Release Category	ERC6a	
Specific ERC	ESVOC 2	
Assessment scenario		
Operational Conditions		
Amounts used		
Amounts used in the EU (tonnes/year)	200,000	
	(total industry tonnage for use in production of	
	polymers)	
Fraction of EU tonnage used in region	1	

Fraction of main source to local	0.075
Fraction of main source to local environment	0.073
Fraction of substance in end-use products	1
1	50,000
Maximum daily site tonnage (kg/day)	30,000
Frequency and duration of use	
Type of release	Continuous
Emission days (days/year)	300 - ESVOC 2
Site specific monitoring data results for	
surface water effluent	
Location of sample	
Environmental factors not influenced by	
risk management	
Local freshwater dilution factor	10 (default)
Local marine water dilution factor	100 (default)
Other given operational conditions	
affecting environmental exposure	
Risk Management Measures	
Technical conditions and measures at	
process level (source) to prevent release	
Technical onsite conditions and	
measures to reduce or limit discharges,	
air emissions and releases to soil	
Treat air emissions to provide a typical	
removal efficiency of (%)	
Treat wastewater (prior to discharge to	87%
receiving water) to provide the required	
removal efficiency of (%) ETotal,RMM =	
$1 - ((1 - ERMM, 1) \times (1 - ERMM, 2))$	
Organizational measures to	
prevent/limit release from site	
Conditions and measures related to	
municipal sewage treatment plant	
Conditions and measures related to	
external treatment of waste for disposal	
Conditions and measures related to	
external recovery of waste	
Other environmental control measures	
additional to above	

Identifier	ES2-E1
Narrative	Release fraction derived from SpERC (ESVOC
	2)
Release fraction to air from process	0.00E+00

Release fraction to wastewater from process	1.00E-02
Release fraction to soil from process (regional only)	1.00E-03
Local release to air (kg/d)	0.00E+00
Local release to sewage (kg/d)	5.00E+02
Local release to soil (kg/d)	5.00E+01
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	
Total efficiency of removal from air emissions (%)	
The maximum allowable site tonnage (M_{Safe}) based on removal from domestic sewage treatment (kg/d)	87,175
Scaling	

The downstream user can check the compliance of his site by comparing site specific data with defaults used in the exposure assessment. The site specific quotient should be inferior or equal to the spERC quotient.

$$\frac{m_{\text{spERC}}^{*}(1-E_{\text{ER,spERC}})^{*}F_{\text{releasespERC}}}{DF_{\text{spERC}}} \ge \frac{m_{\text{site}}^{*}(1-E_{\text{ER,site}})^{*}F_{\text{releasesite}}}{DF_{\text{site}}}$$

 m_{spERC} : Substance use rate in spERC $E_{ER,spERC}$: Efficacy of RMM in spERC

 $F_{release,,spERC}; \quad Initial \quad release \quad fraction \quad in \quad$

spERC

DF_{spERC}: dilution factor of STP effluent in

river

 m_{site} : Substance use rate at site $E_{ER,site}$: Efficacy of RMM at site

 $F_{release,,site}$: Initial release fraction at site DF_{site} : dilution factor of STP effluent in

river

1.2.2.4.1 Predicted exposure concentrations in the STP and in aquatic compartments (freshwater, seawater and sediment)

Table 20: Predicted exposure concentration in the STP and in aquatice compartments (freshwater, seawater and sediment)

Local Concentration, Compartment: STP		
and aquatic	unit	ES2-E1
Local PEC in surface water during emission	mg/L	3.171E+00
episode (dissolved)		
Annual average local PEC in surface water	mg/L	2.608E+00
(dissolved)		
Local PEC in fresh water sediment during	mg/kg	1.199E+01
emission episode	dwt	
Local PEC in sea water during emission	mg/L	3.171E-01
episode		
Annual average local PEC in sea water	mg/L	2.607E-01
(dissolved)		
Local PEC in marine sediment during	mg/kg	1.199E+00
emission episode	dwt	
PEC for microorganisms in STP	mg/L	3.164E+01
Comments		

1.2.2.4.3 Predicted exposure concentration in soils

Table 21: Predicted exposure concentration in soils

Local Concentration, Compartment: soil	unit	ES2-E1
Local PEC in agricultural soil, averaged	mg/kg dwt	1.142E-01
over 30 days		
Local PEC agricultural soil, averaged	mg/kg dwt	3.030E-02
over 180 days		
Local PEC in grass land, averaged over	mg.kg dwt	9.378E-03
180 days		
Comments		

Predicted exposure concentration in the atmospheric compartment

Table 22: Predicted exposure concentration in the atmospheric compartment

Local Concentration, Compartment: air	unit	ES2-E1
Annual average local PEC in air (total)	kg/m ³	2.112E-13
Comments		

1.2.2.4.4 Predicted exposure concentration in food for secondary poisoning

The bioaccumulation potential of this substance is very low, therefore secondary poisoning can be considered negligible. The Kow for DEG is 0.0339.

1.3 Use as Process chemical

1.3.1 Exposure Scenario 3

General Remarks

The relevant OCs used for calculation of environmental exposure are mentioned under paragraph 1.3.2.4.

Table 23: Description of ES 3

Table 23. Description of ES 3		
Reference Number	3	
1.3.1.1 Title	.1 Title	
Free short title	Use as Process chemical	
Systematic title based on use descriptor	SU3; PROC 1, 2, 3, 4, 5, 8a, 8b, 9, 13, 14, and 15; ERC 4	
1.3.1.2 Operational conditions an	nd Risk management measures	
1.3.1.2.1 Control of workers exposure for PROC 1		
Workers related free short title	Use in closed process, no likelihood of exposure	
Use descriptor covered	PROC 1	
Processes, tasks, activities covere	Use of the substance in high integrity contained system where little potential exists for exposures, e.g. any sampling via closed loop systems	
AA.M.Ala.J	ECETOC TRA Worker v2.0 with modifications	
Assessment Method	(see 1. General remarks)	
For further details on OCs and RMMs see Table 14		
1.3.1.2.2 Control of workers exposure for PROC 2		
Workers related free short title Use in closed, continuous process with occurrolled exposure		
Use descriptor covered	PROC 2	
Processes, tasks, activities covere	Continuous process but where the design philosophy is not specifically aimed at minimizing emissions. Occasional exposure will arise e.g. through maintenance, sampling and equipment breakages	
Assessment Method	ECETOC TRA Worker v2.0 with modifications	
F f4l 1-4 2 OC 13	(see 1. General remarks)	
For further details on OCs and RMMs see Table 14		
1.3.1.2.3 Control of workers exposure for PROC 3 and 4		
Workers related free short title	Use in closed batch process (synthesis or formulation).	
	Use in batch and other process (synthesis) where opportunity for exposure arises.	

Use descriptor covered	PROC 3 and 4		
Osc descriptor covered	Batch manufacture of a chemical or formulation		
Processes, tasks, activities covered	where the predominant handling is in a contained manner, e.g. through enclosed transfers, but where some opportunity for contact with chemicals occurs, e.g. through sampling		
	Use in batch manufacture of a chemical where significant opportunity for exposure arises, e.g. during charging, sampling or discharge of material, and when the nature of the design is likely to result in exposure.		
Aggaggman4 Ma4bad	ECETOC TRA Worker v2.0 with modifications		
Assessment Method	(see 1. General remarks)		
For further details on OCs and RMM	Is see Table 2		
1.3.1.2.4 Control of workers exposure	e for PROC 5		
Workers related free short title	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact).		
Use descriptor covered	PROC 5		
Processes, tasks, activities covered	Manufacture or formulation of chemical products or articles using technologies related to mixing and blending of solid or liquid materials, and where the process is in stages and provides the opportunity for significant contact at any stage		
A A No. 41 - J	ECETOC TRA Worker v2.0 with modifications		
Assessment Method	(see 1. General remarks)		
For further details on OCs and RMMs see Table 14			
1.3.1.2.5 Control of workers exposure for PROC 8a			
Workers related free short title	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities.		
Use descriptor covered	PROC 8a		
Processes, tasks, activities covered	Sampling, loading, filling, transfer, dumping, bagging in non- dedicated facilities. Exposure related to dust, vapour, aerosols or spillage, and cleaning of equipment to be expected.		
Assessment Method	ECETOC TRA Worker v2.0 with modifications		
Assessment Method	(see 1. General remarks)		
For further details on OCs and RMMs see Table 2			
1.3.1.2.6 Control of workers exposure for PROC 8b and 9			
Workers related free short title	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities.		

		or preparation into small filling line, including	
Use descriptor covered	PROC 8b and 9		
Processes, tasks, activities covered	Sampling, loading, filling, transfer, dumping, bagging in dedicated facilities. Exposure related to dust, vapour, aerosols or spillage, and cleaning of equipment to be expected.		
		designed to both capture emissions and minimise	
	ECETOC TRA Worker v	2.0 with modifications	
Assessment Method	(see 1. General remarks)		
For further details on OCs and RMM	Is see Table 2 and Table 1	14	
1.3.1.2.7 Control of workers exposure	e for PROC 13		
Workers related free short title	Treatment of articles by dipping and pouring.		
Use descriptor covered	PROC 13	PROC 13	
Processes, tasks, activities covered	Immersion operations. Treatment of articles by dipping, pouring, immersing, soaking, washing out or washing in substances; including cold formation or resin type matrix. Includes handling of treated objects (e.g. after dying, plating). Substance is applied to a surface by low energy techniques such as dipping the article into a bath or pouring a preparation onto a surface.		
Assessment Method	ECETOC TRA Worker v2.0 with modifications (see 1. General remarks)		
Product characteristic			
Physical state	liquid		
Fugacity	Low		
Concentration of substance	100	%	
Vapour pressure of the substance	0.008 hPa		
Amounts used			
Not relevant			
Frequency and duration of use/expos	ure		
Duration of exposure	> 4	hours/day	
F	≤ 240 days/year		
Frequency of exposure	≤ 240	days/year	
Human factors not influenced by risk	L	days/year	
	L		
Human factors not influenced by risk	r management Palm of both hands (480	cm ²)	

Domain		Ind	Industrial			
Technical conditions and measures at process level (source) to prevent release						
None						
Technical conditions and measures to control dispersion from source towards the worker						
Local exhaust ventilation required No		0				
Organisational measures to prevent /limit releases, dispersion and exposure						
Not relevant in ECETOC TRA						
Conditions and measures related to personal protection, hygiene and health evaluation						
Respiratory protection required	No					
Use of suitable gloves with basic training	Yes		Effectiveness: 90%			
1.3.1.2.9 Control of workers exposure for PROC 14						
Workers related free short ti	TITIE		Production of preparations or articles by tabletting, compression, extrusion, pelletisation.			
Use descriptor covered		PR	PROC 14			
Processes, tasks, activities covered		(liq Sub to con vol	Processing of preparations and/or substances (liquid and solid) into preparations or articles. Substances in the chemical matrix may be exposed to elevated mechanical and/or thermal energy conditions. Exposure is predominantly related to volatiles and/or generated fumes, dust may be formed as well.			
Assessment Method		EC	ECETOC TRA Worker v2.0 with modifications			
		(see	(see 1. General remarks)			
Product characteristic						
Physical state		liqu	ıid			
Fugacity		Lov	V			
Concentration of substance		100)	%		
Vapour pressure of the substance		0.0	08	hPa		
Amounts used						
Not relevant						
Frequency and duration of use/exposure						
Duration of exposure	iration of exposure			hours/day		
Frequency of exposure		≤ 2	40	days/year		
Human factors not influenced by risk management						
Exposed skin surface			Palm of both hands (480 cm²)			
Other given operational conditions affecting workers exposure						
Location			Indoor			

Domain	Industrial				
Technical conditions and measures at process level (source) to prevent release					
None					
Technical conditions and measures to control dispersion from source towards the worker					
Local exhaust ventilation required N	0				
Organisational measures to prevent /limit releases, dispersion and exposure					
Not relevant in ECETOC TRA					
Conditions and measures related to personal protection, hygiene and health evaluation					
Respiratory protection required No					
1.3.1.2.10 Control of workers exposure for PROC 15					
Workers related free short title		Use as laboratory reagent			
Use descriptor covered		PROC 15			
Processes, tasks, activities covered		Use of substances at small scale laboratory (< 1 l or 1 kg present at workplace). Larger laboratories and R+D installations should be treated as industrial processes.			
Assessment Method		ECETOC TRA Worker v2.0 with modifications			
		(see 1. General remarks)			
For further details on OCs and RMMs see Table 2					

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

Use of tightly fitting safety goggles

(The substance has shown to cause mucosal irritations at relatively high concentrations. Thus, it is recommended to protect the eyes)

1.3.2 Exposure Estimation

1.3.2.1. Workers exposure

For the estimated exposure for workers / PROC 1 see Table 59
For the estimated exposure for workers / PROC 2 see Table 16
For the estimated exposure for workers / PROC 3 see Table 5
For the estimated exposure for workers / PROC 4 see Table 6
For the estimated exposure for workers / PROC 5 see Table 17
For the estimated exposure for workers / PROC 8a see Table 7
For the estimated exposure for workers / PROC 8b see Table 8
For the estimated exposure for workers / PROC 9 see Table 18
For the estimated exposure for workers / PROC 15 see Table 9

Table 24: Estimated exposure for workers – PROC 13

Calculation tool used: ECETOC TRA 2.0 modified (see 1. General remarks)

Route of exposure	Concentrations		Justification
	Value	Unit	
Long-term exposure, systemic/local, inhalative	44.22	mg/m³	NA
Long-term exposure, systemic, dermal	1.37	mg/kg bw/d	NA

NA = Not applicable

Table 25: Estimated exposure for workers – PROC 14

Calculation tool used: ECETOC TRA 2.0 modified (see 1. General remarks)

Route of exposure	Concentrations		Justification
	Value	Unit	
Long-term exposure, systemic/local, inhalative	22.11	mg/m³	NA
Long-term exposure, systemic, dermal	3.43	mg/kg bw/d	NA

NA = Not applicable

1.3.2.2. Consumer exposure

Not applicable

1.3.2.3. Indirect exposure of humans via the environment (oral)

The bioaccumulation potential of this substance is very low, with a Kow of 0.0339; therefore, indirect exposure of humans via the environment can be considered negligible.

1.3.2.4. Environmental exposure

Table 26: Environmental Exposure Scenario ES3-E1

Section 1	Operational conditions and risk management measures	
Section 1.2	Control of environmental exposure	
Identifier*	ES3-E1	
Contributing scenario	Use As Process Chemical	
Environmental Release Category	ERC4	
Specific ERC	ESVOC 44	
Assessment scenario		
Operational Conditions		
Amounts used		

Amounts used in the EU (tonnes/year)	200,000
((total industry tonnage for use in production of
	polymers)
Fraction of EU tonnage used in region	1
Fraction of main source to local	0.075
environment	
Fraction of substance in end-use products	1
Maximum daily site tonnage (kg/day)	50,000
Frequency and duration of use	
Type of release	Continuous
Emission days (days/year)	300 - ESVOC 44
Site specific monitoring data results for surface water effluent	
Location of sample	
Environmental factors not influenced by	
risk management	
Local freshwater dilution factor	10 (default)
Local marine water dilution factor	100 (default)
Other given operational conditions	
affecting environmental exposure	
Risk Management Measures	
Technical conditions and measures at	
process level (source) to prevent release	
Technical onsite conditions and	
measures to reduce or limit discharges,	
air emissions and releases to soil	
Treat air emissions to provide a typical	
removal efficiency of (%)	
Treat wastewater (prior to discharge to	87%
receiving water) to provide the required	
removal efficiency of (%) ETotal,RMM = 1 – ((1 – ERMM, 1) x (1 – ERMM,2))	
Organizational measures to prevent/limit release from site	
Conditions and measures related to	
municipal sewage treatment plant	
Conditions and measures related to	
external treatment of waste for disposal	
Conditions and measures related to	
external recovery of waste	
Other environmental control measures additional to above	
Identifier	ES3-E1
Narrative	Release fraction derived from SpERC (ESVOC
4 1004 4 00 0 A 1 W	received notified from Sperice (ES VOC

	44)
Release fraction to air from process	2.00E-02
Release fraction to wastewater from process	0.00E+00
Release fraction to soil from process (regional only)	1.00E-05
Local release to air (kg/d)	1.00E+03
Local release to sewage (kg/d)	0.00E+00
Local release to soil (kg/d)	5.00E-01
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	
Total efficiency of removal from air emissions (%)	
The maximum allowable site tonnage (M _{Safe}) based on removal from domestic sewage treatment (kg/d)	1,025,591
Scaling	

The downstream user can check the compliance of his site by comparing site specific data with defaults used in the exposure assessment. The site specific quotient should be inferior or equal to the spERC quotient.

$$\frac{m_{\text{spERC}} * (1 - E_{\text{ER,spERC}}) * F_{\text{releasespERC}}}{DF_{\text{spERC}}} \ge \frac{m_{\text{site}} * (1 - E_{\text{ER,site}}) * F_{\text{releasesite}}}{DF_{\text{site}}}$$

 m_{spERC} : Substance use rate in spERC $E_{ER,spERC}$: Efficacy of RMM in spERC $F_{release,,spERC}$: Initial release fraction in

spERC

DF_{spERC}: dilution factor of STP effluent in

river

 m_{site} : Substance use rate at site $E_{ER,site}$: Efficacy of RMM at site

 $F_{release,,site}$: Initial release fraction at site DF_{site} : dilution factor of STP effluent in

river

1.3.2.4.1 Predicted exposure concentrations in the STP and in the aquatic compartments (freshwater, seawater and sediments)

Table 27: Predicted exposure concentrations in the STP and in the aquatic compartments (freshwater, seawater and sediments)

Local Concentration, Compartment: STP		
and aquatic	unit	ES3-E1
Local PEC in surface water during emission episode (dissolved)	mg/L	1.189E-02
Annual average local PEC in surface water (dissolved)	mg/L	1.189E-02
Local PEC in fresh water sediment during emission episode	mg/kg dwt	4.494E-02
Local PEC in sea water during emission episode	mg/L	1.227E-03
Annual average local PEC in sea water (dissolved)	mg/L	1.227E-03
Local PEC in marine sediment during emission episode	mg/kg dwt	4.636E-03
PEC for microorganisms in STP	mg/L	0.000E+00
Comments		

1.3.2.4.2 Predicted exposure concentration in soils

Table 28: Predicted exposure concentration in soils

Local Concentration, Compartment: soil	unit	ES3-E1
Local PEC in agricultural soil, averaged over 30 days	mg/kg dwt	7.459E-02
Local PEC agricultural soil, averaged over 180 days	mg/kg dwt	7.442E-02
Local PEC in grass land, averaged over 180 days	mg.kg dwt	9.708E-02
Comments		

1.3.2.4.3 Predicted exposure concentration in the atmospheric compartment

Table 29: Predicted exposure concentration in the atmospheric compartment

Local	Concentration,		
Compartment: a	ir	unit	ES3-E1
Annual average (total)	local PEC in air	kg/m ³	2.285E-07
Comments			

1.3.2.4.4 Predicted exposure concentration in food for secondary poisoning

The bioaccumulation potential of this substance is very low, therefore secondary poisoning

can be considered negligible. The Kow for DEG is 0.0339.

1.4 Distribution of substance

1.4.1 Exposure Scenario 4

General Remarks

The relevant OCs used for calculation of environmental exposure are mentioned under paragraph 1.4.2.4.

Table 30: Description of ES 4

Reference Number	4	
1.4.1.1 Title		
Free short title	Distribution of substance	
Systematic title based on use descriptor	SU3; PROC 1, 2, 3, 4, 8a, 8b, 9, and 15; ERC 1	
1.4.1.2 Operational conditions and Risk management measures		
1.4.1.2.1 Control of workers exposure for PROC 1		
Workers related free short title	Use in closed process, no likelihood of exposure	
Use descriptor covered	PROC 1	
Processes, tasks, activities covere	Use of the substance in high integrity contained system where little potential exists for exposures, e.g. any sampling via closed loop systems	
Assessment Method	ECETOC TRA Worker v2.0 with modifications	
Assessment Wethod	(see 1. General remarks)	
For further details on OCs and F	RMMs see Table 14	
1.4.1.2.2 Control of workers expo	osure for PROC 2	
Workers related free short title Use in closed, continuous process with occasion controlled exposure		
Use descriptor covered PROC 2		
Processes, tasks, activities covere	Continuous process but where the design philosophy is not specifically aimed at minimizing emissions. Occasional exposure will arise e.g. through maintenance, sampling and equipment breakages	
Assessment Method	ECETOC TRA Worker v2.0 with modifications	
Assessment Method	(see 1. General remarks)	
For further details on OCs and RMMs see Table 14		
1.4.1.2.3 Control of workers exposure for PROC 3 and 4		
Workers related free short title	Use in closed batch process (synthesis or formulation).	

	1	
	Use in batch and other process (synthesis) where opportunity for exposure arises.	
Use descriptor covered	PROC 3 and 4	
Processes, tasks, activities covered	Batch manufacture of a chemical or formulation where the predominant handling is in a contained manner, e.g. through enclosed transfers, but where some opportunity for contact with chemicals occurs, e.g. through sampling	
	Use in batch manufacture of a chemical where significant opportunity for exposure arises, e.g. during charging, sampling or discharge of material, and when the nature of the design is likely to result in exposure.	
Assessment Method	ECETOC TRA Worker v2.0 with modifications	
Assessment Method	(see 1. General remarks)	
For further details on OCs and RMM	Is see Table 2	
1.4.1.2.4 Control of workers exposure for PROC 8a		
Workers related free short title	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities.	
Use descriptor covered	PROC 8a	
Processes, tasks, activities covered	Sampling, loading, filling, transfer, dumping, bagging in non- dedicated facilities. Exposure related to dust, vapour, aerosols or spillage, and cleaning of equipment to be expected.	
	ECETOC TRA Worker v2.0 with modifications	
Assessment Method	(see 1. General remarks)	
For further details on OCs and RMMs see Table 2		
1.4.1.2.5 Control of workers exposure	e for PROC 8b and 9	
	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities.	
Workers related free short title	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	
Use descriptor covered	PROC 8b and 9	
Processes, tasks, activities covered	Sampling, loading, filling, transfer, dumping, bagging in dedicated facilities. Exposure related to dust, vapour, aerosols or spillage, and cleaning of equipment to be expected.	
	Filling lines specifically designed to both capture vapour and aerosol emissions and minimise spillage	

	ECETOC TRAIN 1 20 11 110 11	
Assessment Method	ECETOC TRA Worker v2.0 with modifications	
	(see 1. General remarks)	
For further details on OCs and RMMs see Table 2 and Table 14		
1.4.1.2.6 Control of workers exposure for PROC 15		
Workers related free short title	Use as laboratory reagent	
Use descriptor covered	PROC 15	
Processes, tasks, activities covered	Use of substances at small scale laboratory (< 1 l or 1 kg present at workplace). Larger laboratories and R+D installations should be treated as industrial processes.	
Assessment Method	ECETOC TRA Worker v2.0 with modifications (see 1. General remarks)	
For further details on OCs and RMMs see Table 2		

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

Use of tightly fitting safety goggles

(The substance has shown to cause mucosal irritations at relatively high concentrations. Thus, it is recommended to protect the eyes)

1.4.2 Exposure Estimation

1.4.2.1. Workers exposure

For the estimated exposure for workers / PROC 1 see Table 15 For the estimated exposure for workers / PROC 2 see Table 16 For the estimated exposure for workers / PROC 3 see Table 5 For the estimated exposure for workers / PROC 4 see Table 6 For the estimated exposure for workers / PROC 8a see Table 7 For the estimated exposure for workers / PROC 8b see Table 8 For the estimated exposure for workers / PROC 9 see Table 18 For the estimated exposure for workers / PROC 15 see Table 9

1.4.2.2. Consumer exposure

Not applicable

1.4.2.3. Indirect exposure of humans via the environment (oral)

The bioaccumulation potential of this substance is very low, with a Kow of 0.0339; therefore, indirect exposure of humans via the environment can be considered negligible.

9.4.2.4. Environmental exposure

Table 31: Environmental Exposure Scenario ES4-E1

Section 1	Operational conditions and risk	
	management measures	
Section 1.2	Control of environmental exposure	
Identifier*	ES4-E1	
Contributing scenario	Distribution Of Substance	
Environmental Release Category	ERC1	
Specific ERC	ESVOC 3	
Assessment scenario		
Operational Conditions		
Amounts used		
Amounts used in the EU (tonnes/year)	200,000	
	(total industry tonnage for use in production of	
	polymers)	
Fraction of EU tonnage used in region	1	
Fraction of main source to local	0.002	
environment		
Fraction of substance in end-use products	1	
Maximum daily site tonnage (kg/day)	1,333	
Frequency and duration of use		
Type of release	Continuous	
Emission days (days/year)	300 - ESVOC 3	

Site specific monitoring data results for	
surface water effluent	
Location of sample	
Environmental factors not influenced by	
risk management	
Local freshwater dilution factor	10 (default)
Local marine water dilution factor	100 (default)
Other given operational conditions	
affecting environmental exposure	
Risk Management Measures	
Technical conditions and measures at	
process level (source) to prevent release	
Technical onsite conditions and	
measures to reduce or limit discharges,	
air emissions and releases to soil	
Treat air emissions to provide a typical removal efficiency of (%)	
Treat wastewater (prior to discharge to	87%
receiving water) to provide the required	
removal efficiency of (%) ETotal,RMM =	
$1 - ((1 - ERMM, 1) \times (1 - ERMM, 2))$	
Organizational measures to	
prevent/limit release from site	
Conditions and measures related to	
municipal sewage treatment plant	
Conditions and measures related to	
external treatment of waste for disposal	
Conditions and measures related to	
Conditions and measures related to	

Identifier	ES4-E1
Narrative	Release fraction derived from SpERC (ESVOC 3)
Release fraction to air from process	1.00E-05
Release fraction to wastewater from process	1.00E-05
Release fraction to soil from process (regional only)	1.00E-05
Local release to air (kg/d)	1.33E-02
Local release to sewage (kg/d)	1.33E-02
Local release to soil (kg/d)	1.33E-02
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	
Total efficiency of removal from air emissions (%)	
The maximum allowable site tonnage (M_{Safe}) based on removal from domestic sewage treatment (kg/d)	72,381,806
Scaling	

The downstream user can check the compliance of his site by comparing site specific data with defaults used in the exposure assessment. The site specific quotient should be inferior or equal to the spERC quotient.

$$\frac{m_{\text{spERC}}^{*}(1-E_{\text{ER,spERC}})*F_{\text{releasespERC}}}{DF_{\text{spERC}}} \ge \frac{m_{\text{site}}*(1-E_{\text{ER,site}})*F_{\text{releasesite}}}{DF_{\text{site}}}$$

 m_{spERC} : Substance use rate in spERC $E_{ER,spERC}$: Efficacy of RMM in spERC $F_{release,,spERC}$: Initial release fraction in

spERC

DF_{spERC}: dilution factor of STP effluent in

river

 m_{site} : Substance use rate at site $E_{ER,site}$: Efficacy of RMM at site

 $F_{release,,site}$: Initial release fraction at site DF_{site} : dilution factor of STP effluent in

river

1.4.2.4.1 Predicted exposure concentrations in the STP and in the aquatic compartments (freshwater, seawater and sediments)

Table 32: Predicted exposure concentrations in the STP and in the aquatic compartments (freshwater, seawater and sediments)

Local Concentration, Compartment: STP		
and aquatic	unit	ES4-E1
Local PEC in surface water during emission episode (dissolved)	mg/L	1.018E-04
Annual average local PEC in surface water (dissolved)	mg/L	8.682E-05
Local PEC in fresh water sediment during emission episode	mg/kg dwt	3.850E-04
Local PEC in sea water during emission episode	mg/L	1.014E-05
Annual average local PEC in sea water (dissolved)	mg/L	8.641E-06
Local PEC in marine sediment during emission episode	mg/kg dwt	3.834E-05
PEC for microorganisms in STP	mg/L	8.437E-04
Comments		

1.4.2.4.2 Predicted exposure concentration in soils

Table 33: Predicted exposure concentration in soils

Local Concentration, Compartment: soil	unit	ES4-E1
PEC Local in agricultural soil, averaged over 30 days	mg/kg dwt	1.998E-05
Local PEC agricultural soil, averaged over 180 days	mg/kg dwt	1.775E-05
Local PEC in grass land, averaged over 180 days	mg/kg dwt	1.749E-05
Comments		

1.4.2.4.3 Predicted exposure concentration in the atmospheric compartment

Table 34: Predicted exposure concentration in the atmospheris compartment

Local	Concentration,		
Compartment: a	uir	unit	ES4-E1
Annual average (total)	local PEC in air	kg/m ³	3.057E-12
Comments			

1.4.2.4.4 Predicted exposure concentration in food for secondary poisoningThe bioaccumulation potential of this substance is very low, therefore secondary poisoning can be considered negligible. The Kow for DEG is 0.0339.

1.5 Formulation & (re)packing of substance and mixtures

1.5.1 Exposure Scenario 5

General Remarks

The relevant OCs used for calculation of environmental exposure are mentioned under paragraph 1.5.2.4.

Table 35: Description of ES 5

Table 35: Description of ES 5			
Reference Number	5		
1.5.1.1 Title			
Free short title	Formulation & (re)packing of substance and mixtures		
Systematic title based on use descriptor	SU3; PROC 1, 2, 3, 4, 5, 8a, 8b, 9, 14, and 15; ERC 2		
1.5.1.2 Operational conditions and Risk management measures			
1.5.1.2.1 Control of workers exposure for PROC 1			
Workers related free short title	Use in closed process, no likelihood of exposure		
Use descriptor covered	PROC 1		
Processes, tasks, activities covere	Use of the substance in high integrity contained system where little potential exists for exposures, e.g. any sampling via closed loop systems		
Aggagament Mathad	ECETOC TRA Worker v2.0 with modifications		
Assessment Method	(see 1. General remarks)		
For further details on OCs and RMMs see Table 14			
1.5.1.2.2 Control of workers expe	osure for PROC 2		
Workers related free short title Use in closed, continuous process with occasional controlled exposure			
Use descriptor covered	PROC 2		
Processes, tasks, activities covere	Continuous process but where the design philosophy is not specifically aimed at minimizing emissions. Occasional exposure will arise e.g. through maintenance, sampling and equipment breakages		
Assessment Method	ECETOC TRA Worker v2.0 with modifications		
Assessment viction	(see 1. General remarks)		
For further details on OCs and l	For further details on OCs and RMMs see Table 14		
9.5.1.2.3 Control of workers exposure for PROC 3 and 4			
Workers related free short title	Use in closed batch process (synthesis or formulation). Use in batch and other process (synthesis) where		
	opportunity for exposure arises.		

Use descriptor covered	PROC 3 and 4		
Osc descriptor covered			
Dyonogog tooks activities acress	Batch manufacture of a chemical or formulation where the predominant handling is in a contained manner, e.g. through enclosed transfers, but where some opportunity for contact with chemicals occurs, e.g. through sampling		
Processes, tasks, activities covered	Use in batch manufacture of a chemical where significant opportunity for exposure arises, e.g. during charging, sampling or discharge of material, and when the nature of the design is likely to result in exposure.		
Aggaggman4 Ma4bad	ECETOC TRA Worker v2.0 with modifications		
Assessment Method	(see 1. General remarks)		
For further details on OCs and RMMs see Table 2			
1.5.1.2.4 Control of workers exposure for PROC 5			
Workers related free short title	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact).		
Use descriptor covered	PROC 5		
Processes, tasks, activities covered	Manufacture or formulation of chemical products or articles using technologies related to mixing and blending of solid or liquid materials, and where the process is in stages and provides the opportunity for significant contact at any stage		
A A No. 41 - J	ECETOC TRA Worker v2.0 with modifications		
Assessment Method	(see 1. General remarks)		
For further details on OCs and RMM	Is see Table 14		
1.5.1.2.5 Control of workers exposure	e for PROC 8a		
Workers related free short title	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities.		
Use descriptor covered	PROC 8a		
Processes, tasks, activities covered	Sampling, loading, filling, transfer, dumping, bagging in non- dedicated facilities. Exposure related to dust, vapour, aerosols or spillage, and cleaning of equipment to be expected.		
Assessment Method	ECETOC TRA Worker v2.0 with modifications		
ASSESSMENT MUMU	(see 1. General remarks)		
For further details on OCs and RMM	Is see Table 2		
1.5.1.2.6 Control of workers exposure	for PROC 8b and 9		
Workers related free short title	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities.		

Processes, tasks, activities covered Filling	8b and 9 ing, loading, filling, transfer, dumping, ag in dedicated facilities. Exposure related to rapour, aerosols or spillage, and cleaning of ment to be expected.		
Processes, tasks, activities covered baggin dust, v equipm Filling vapour	g in dedicated facilities. Exposure related to vapour, aerosols or spillage, and cleaning of		
vapoui	-		
spinag	lines specifically designed to both capture and aerosol emissions and minimise e		
Assessment Method ECET	OC TRA Worker v2.0 with modifications		
(see 1.	(see 1. General remarks)		
For further details on OCs and RMMs see Table 2 and Table 14			
1.5.1.2.7 Control of workers exposure for PROC 14			
	Production of preparations or articles by tabletting, compression, extrusion, pelletisation.		
Use descriptor covered PROC	14		
Processes, tasks, activities covered (liquid Substate to ele conditivolatile)	Processing of preparations and/or substances (liquid and solid) into preparations or articles. Substances in the chemical matrix may be exposed to elevated mechanical and/or thermal energy conditions. Exposure is predominantly related to volatiles and/or generated fumes, dust may be formed as well.		
Assessment Method ECET	ECETOC TRA Worker v2.0 with modifications		
Assessment Method (see 1.	General remarks)		
For further details on OCs and RMMs see Ta	able 67		
1.5.1.2.8 Control of workers exposure for PR	OC 15		
Workers related free short title Use as	laboratory reagent		
Use descriptor covered PROC	15		
Processes, tasks, activities covered or 1 k and F	f substances at small scale laboratory (< 1 l g present at workplace). Larger laboratories R+D installations should be treated as rial processes.		
Assessment Method	OC TRA Worker v2.0 with modifications General remarks)		
For further details on OCs and RMMs see Ta			

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

Use of tightly fitting safety goggles

(The substance has shown to cause mucosal irritations at relatively high concentrations. Thus, it is recommended to protect the eyes)

1.5.2 Exposure Estimation

1.5.2.1. Workers exposure

For the estimated exposure for workers / PROC 1 see Table 15
For the estimated exposure for workers / PROC 2 see Table 16
For the estimated exposure for workers / PROC 3 see Table 5
For the estimated exposure for workers / PROC 4 see Table 6
For the estimated exposure for workers / PROC 5 see Table 61
For the estimated exposure for workers / PROC 8a see Table 7
For the estimated exposure for workers / PROC 8b see Table 8
For the estimated exposure for workers / PROC 9 see Table 18
For the estimated exposure for workers / PROC 14 see Table 25
For the estimated exposure for workers / PROC 15 see Table 9

1.5.2.2. Consumer exposure

Not applicable

9.5.2.3. Indirect exposure of humans via the environment (oral)

The bioaccumulation potential of this substance is very low, with a Kow of 0.0339; therefore, indirect exposure of humans via the environment can be considered negligible.

1.5.2.4. Environmental exposure

Table 36: Environmental Exposure Scenario ES5-E1

Section 1	Operational conditions and risk
	management measures
Section 1.2	Control of environmental exposure
Identifier*	ES5-E1
Contributing scenario	Formulation & (Re) Packing Of Substances And Mixtures
Environmental Release Category	ERC2
Specific ERC	ESVOC 4
Assessment scenario	
Operational Conditions	
Amounts used	
Amounts used in the EU (tonnes/year)	200,000 (total industry tonnage for use in production of polymers)
Fraction of EU tonnage used in region	1

Fraction of main source to local environment	0.15
Fraction of substance in end-use products	1
Maximum daily site tonnage (kg/day)	100,000
Frequency and duration of use	
Type of release	Continuous
Emission days (days/year)	300 - ESVOC 4
Site specific monitoring data results for	200 251001
surface water effluent	
Location of sample	
Environmental factors not influenced by	
risk management	
Local freshwater dilution factor	10 (default)
Local marine water dilution factor	100 (default)
Other given operational conditions	,
affecting environmental exposure	
Risk Management Measures	
Technical conditions and measures at	
process level (source) to prevent release	
Technical onsite conditions and	
measures to reduce or limit discharges,	
air emissions and releases to soil	
Treat air emissions to provide a typical	
removal efficiency of (%)	87%
	87%
removal efficiency of (%) Treat wastewater (prior to discharge to receiving water) to provide the required removal efficiency of (%) ETotal,RMM =	87%
removal efficiency of (%) Treat wastewater (prior to discharge to receiving water) to provide the required removal efficiency of (%) ETotal,RMM = 1 – ((1 – ERMM, 1) x (1 – ERMM,2))	87%
removal efficiency of (%) Treat wastewater (prior to discharge to receiving water) to provide the required removal efficiency of (%) ETotal,RMM = 1 - ((1 - ERMM, 1) x (1 - ERMM,2)) Organizational measures to	87%
removal efficiency of (%) Treat wastewater (prior to discharge to receiving water) to provide the required removal efficiency of (%) ETotal,RMM = 1 - ((1 - ERMM, 1) x (1 - ERMM,2)) Organizational measures to prevent/limit release from site	87%
removal efficiency of (%) Treat wastewater (prior to discharge to receiving water) to provide the required removal efficiency of (%) ETotal,RMM = 1 - ((1 - ERMM, 1) x (1 - ERMM,2)) Organizational measures to prevent/limit release from site Conditions and measures related to	87%
removal efficiency of (%) Treat wastewater (prior to discharge to receiving water) to provide the required removal efficiency of (%) ETotal,RMM = 1 - ((1 - ERMM, 1) x (1 - ERMM,2)) Organizational measures to prevent/limit release from site Conditions and measures related to municipal sewage treatment plant	87%
removal efficiency of (%) Treat wastewater (prior to discharge to receiving water) to provide the required removal efficiency of (%) ETotal,RMM = 1 - ((1 - ERMM, 1) x (1 - ERMM,2)) Organizational measures to prevent/limit release from site Conditions and measures related to municipal sewage treatment plant Conditions and measures related to	87%
removal efficiency of (%) Treat wastewater (prior to discharge to receiving water) to provide the required removal efficiency of (%) ETotal,RMM = 1 - ((1 - ERMM, 1) x (1 - ERMM,2)) Organizational measures to prevent/limit release from site Conditions and measures related to municipal sewage treatment plant Conditions and measures related to external treatment of waste for disposal	87%
removal efficiency of (%) Treat wastewater (prior to discharge to receiving water) to provide the required removal efficiency of (%) ETotal,RMM = 1 - ((1 - ERMM, 1) x (1 - ERMM,2)) Organizational measures to prevent/limit release from site Conditions and measures related to municipal sewage treatment plant Conditions and measures related to external treatment of waste for disposal Conditions and measures related to	87%
removal efficiency of (%) Treat wastewater (prior to discharge to receiving water) to provide the required removal efficiency of (%) ETotal,RMM = 1 - ((1 - ERMM, 1) x (1 - ERMM,2)) Organizational measures to prevent/limit release from site Conditions and measures related to municipal sewage treatment plant Conditions and measures related to external treatment of waste for disposal Conditions and measures related to external recovery of waste	87%
removal efficiency of (%) Treat wastewater (prior to discharge to receiving water) to provide the required removal efficiency of (%) ETotal,RMM = 1 - ((1 - ERMM, 1) x (1 - ERMM,2)) Organizational measures to prevent/limit release from site Conditions and measures related to municipal sewage treatment plant Conditions and measures related to external treatment of waste for disposal Conditions and measures related to external recovery of waste Other environmental control measures	87%
removal efficiency of (%) Treat wastewater (prior to discharge to receiving water) to provide the required removal efficiency of (%) ETotal,RMM = 1 - ((1 - ERMM, 1) x (1 - ERMM,2)) Organizational measures to prevent/limit release from site Conditions and measures related to municipal sewage treatment plant Conditions and measures related to external treatment of waste for disposal Conditions and measures related to external recovery of waste	
removal efficiency of (%) Treat wastewater (prior to discharge to receiving water) to provide the required removal efficiency of (%) ETotal,RMM = 1 - ((1 - ERMM, 1) x (1 - ERMM,2)) Organizational measures to prevent/limit release from site Conditions and measures related to municipal sewage treatment plant Conditions and measures related to external treatment of waste for disposal Conditions and measures related to external recovery of waste Other environmental control measures additional to above Identifier	ES5-E1
removal efficiency of (%) Treat wastewater (prior to discharge to receiving water) to provide the required removal efficiency of (%) ETotal,RMM = 1 - ((1 - ERMM, 1) x (1 - ERMM,2)) Organizational measures to prevent/limit release from site Conditions and measures related to municipal sewage treatment plant Conditions and measures related to external treatment of waste for disposal Conditions and measures related to external recovery of waste Other environmental control measures additional to above	
removal efficiency of (%) Treat wastewater (prior to discharge to receiving water) to provide the required removal efficiency of (%) ETotal,RMM = 1 - ((1 - ERMM, 1) x (1 - ERMM,2)) Organizational measures to prevent/limit release from site Conditions and measures related to municipal sewage treatment plant Conditions and measures related to external treatment of waste for disposal Conditions and measures related to external recovery of waste Other environmental control measures additional to above Identifier	ES5-E1 Release fraction derived from SpERC (ESVOC
removal efficiency of (%) Treat wastewater (prior to discharge to receiving water) to provide the required removal efficiency of (%) ETotal,RMM = 1 - ((1 - ERMM, 1) x (1 - ERMM,2)) Organizational measures to prevent/limit release from site Conditions and measures related to municipal sewage treatment plant Conditions and measures related to external treatment of waste for disposal Conditions and measures related to external recovery of waste Other environmental control measures additional to above Identifier Narrative	ES5-E1 Release fraction derived from SpERC (ESVOC 4)

Release fraction to soil from process (regional only)	1.00E-04
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	2.505+02
Local release to air (kg/d)	2.50E+02
Local release to sewage (kg/d)	5.00E+02
Local release to soil (kg/d)	1.00E+01
Total efficiency of removal from	
wastewater after onsite and offsite	
(domestic treatment plant) RMMs (%)	
Total efficiency of removal from air	
emissions (%)	
The maximum allowable site tonnage	174,474
(M _{Safe}) based on removal from domestic	
sewage treatment (kg/d)	
Scaling	

The downstream user can check the compliance of his site by comparing site specific data with defaults used in the exposure assessment. The site specific quotient should be inferior or equal to the spERC quotient.

$$\frac{m_{\text{spERC}} * (1 - E_{\text{ER,spERC}}) * F_{\text{releasespERC}}}{DF_{\text{spERC}}} \ge \frac{m_{\text{site}} * (1 - E_{\text{ER,site}}) * F_{\text{releasesite}}}{DF_{\text{site}}}$$

m_{spERC}: Substance use rate in spERC E_{ER,spERC}: Efficacy of RMM in spERC F_{release,,spERC}: Initial release fraction in

spERC

DF_{spERC}: dilution factor of STP effluent in

river

m_{site}: Substance use rate at site E_{ER,site}: Efficacy of RMM at site

F_{release..site}: Initial release fraction at site DF_{site}: dilution factor of STP effluent in

river

1.5.2.4.1 Predicted exposure concentrations in the STP and in the aquatic compartments (freshwater, seawater and sediments)

Table 37: Predicted exposure concentrations in the STP and in the aquatic compartments (freshwater, seawater and sediments)

Local Concentration, Compartment: STP		
and aquatic	unit	ES5-E1
Local PEC in surface water during emission	mg/L	3.169E+00
episode (dissolved)		
Annual average local PEC in surface water	mg/L	2.605E+00
(dissolved)		
Local PEC in fresh water sediment during	mg/kg	1.198E+01
emission episode	dwt	
Local PEC in sea water during emission	mg/L	3.169E-01
episode		
Annual average local PEC in sea water	mg/L	2.605E-01
(dissolved)		
Local PEC in marine sediment during	mg/kg	1.198E+00
emission episode	dwt	
PEC for microorganisms in STP	mg/L	3.164E+01
Comments		

1.5.2.4.2 Predicted exposure concentration in soils

Table 38: Predicted exposure concentration in soils

Local Concentration, Compartment: soil	unit	ES5-E1
Local PEC in agricultural soil, averaged over 30 days	mg/kg dwt	1.287E-01
Local PEC agricultural soil, averaged over 180 days	mg/kg dwt	4.481E-02
Local PEC in grass land, averaged over 180 days	mg.kg dwt	2.957E-02
Comments		

1.5.2.4.3 Predicted exposure concentration in the atmospheric compartment

Table 39: Predicted exposure concentration in the atmospheric compartment

Local	Concentration,		
Compartment: a	ir	unit	ES5-E1
Annual average (total)	local PEC in air	kg/m ³	5.713E-08
Comments			

1.5.2.4.4 Predicted exposure concentration in food for secondary poisoningThe bioaccumulation potential of this substance is very low, therefore secondary poisoning can be considered negligible. The Kow for DEG is 0.0339.

1.6 Production of Polymers

1.6.1 Exposure Scenario 6

General Remarks

The relevant OCs used for calculation of environmental exposure are mentioned under paragraph 1.6.2.4.

Table 40: Description of ES 6

Table 40: Description of ES 0			
Reference Number	6		
1.6.1.1 Title			
Free short title	Production of polymers		
Systematic title based on use descriptor	SU3; PROC 1, 2, 3, 4, 5, 6, 8a, 8b, 9, and 15; ERC 6c		
1.6.1.2 Operational conditions and Risk management measures			
1.6.1.2.1 Control of workers expe	osure for PROC 1		
Workers related free short title	Use in closed process, no likelihood of exposure		
Use descriptor covered	PROC 1		
Processes, tasks, activities covere	Use of the substance in high integrity contained system where little potential exists for exposures, e.g. any sampling via closed loop systems		
Aggagament Mathad	ECETOC TRA Worker v2.0 with modifications		
Assessment Method	(see 1. General remarks)		
For further details on OCs and RMMs see Table 14			
1.6.1.2.2 Control of workers exposure for PROC 2			
Workers related free short title	Use in closed, continuous process with occasional controlled exposure		
Use descriptor covered	PROC 2		
Processes, tasks, activities covere	Continuous process but where the design philosophy is not specifically aimed at minimizing emissions. Occasional exposure will arise e.g. through maintenance, sampling and equipment breakages		
Assessment Method	ECETOC TRA Worker v2.0 with modifications		
Assessment Method	(see 1. General remarks)		
For further details on OCs and RMMs see Table 14			
1.6.1.2.3 Control of workers exposure for PROC 3 and 4			
Workers related free short title	Use in closed batch process (synthesis or formulation). Use in batch and other process (synthesis) where		
	opportunity for exposure arises.		

Use descriptor covered	PROC 3 and 4		
	Batch manufacture of a chemical or formulation where the predominant handling is in a contained manner, e.g. through enclosed transfers, but where some opportunity for contact with chemicals occurs, e.g. through sampling		
Processes, tasks, activities covered	Use in batch manufacture of a chemical where significant opportunity for exposure arises, e.g. during charging, sampling or discharge of material, and when the nature of the design is likely to result in exposure.		
Assessment Method	ECETOC TRA Worker v	2.0 with modifications	
Assessment Method	(see 1. General remarks)		
For further details on OCs and RMM	Is see Table 2		
1.6.1.2.4 Control of workers exposure	for PROC 5		
Workers related free short title	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact).		
Use descriptor covered	PROC 5		
Processes, tasks, activities covered	Manufacture or formulation of chemical products or articles using technologies related to mixing and blending of solid or liquid materials, and where the process is in stages and provides the opportunity for significant contact at any stage		
Assessment Method	ECETOC TRA Worker v2.0 with modifications		
	(see 1. General remarks)		
	For further details on OCs and RMMs see Table 14		
1.6.1.2.5 Control of workers exposure			
Workers related free short title	Calendering operations		
Use descriptor covered	PROC 6		
Processes, tasks, activities covered	Processing of product elevated temperature an la	matrix Calendering at arge exposed surface	
Assessment Method	ECETOC TRA Worker v (see 1. General remarks)	2.0 with modifications	
Product characteristic	1		
Physical state	Liquid		
Fugacity	Low		
Concentration of substance	100	%	
Concentration of Sacstance			
Vapour pressure of the substance	0.008	hPa	
	0.008	hPa	

E 11 4' C				
Frequency and duration of u	ise/expos	ure > 4		1 /1
Duration of exposure				hours/day
Frequency of exposure	\leq 240 days/year			days/year
Human factors not influence	d by risk	mai	nagement	
Exposed skin surface		Bot	h hands (960 cm ²)	
Other given operational cond	ditions af	fecti	ng workers exposure	,
Location		Ind	oor	
Domain		Ind	ustrial	
Technical conditions and me	asures at	pro	cess level (source) to	prevent release
None				
Technical conditions and n worker	neasures	to c	ontrol dispersion fr	om source towards the
Local exhaust ventilation requ	ired No)		
Organisational measures to	prevent /	limit	releases, dispersion	and exposure
Not relevant in ECETOC TRA	1			
Conditions and measures rel	ated to p	erso	nal protection, hygie	ne and health evaluation
Respiratory protection required	No			
Use of suitable gloves with basic training	Yes Effectiveness: 90%			
1.5.1.2.6 Control of workers exposure for PROC 8a				
Workers related free short to	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities.			
Use descriptor covered		PROC 8a		
Processes, tasks, activities co	vered	Sampling, loading, filling, transfer, dumping, bagging in non- dedicated facilities. Exposure related to dust, vapour, aerosols or spillage, and cleaning of equipment to be expected.		
Assessment Mathad	ECETOC TRA Worker v2.0 with modification			2.0 with modifications
Assessment Method		(see	e 1. General remarks)	
For further details on OCs a	nd RMM	ls sec	Table 2	
1.5.1.2.7 Control of workers exposure for PROC 8b and 9				
Workers related free short to			from/to vessels/large acilities.	
	weighing)			
Use descriptor covered		PK	OC 8b and 9	

Processes, tasks, activities covered	Sampling, loading, filling, transfer, dumping, bagging in dedicated facilities. Exposure related to dust, vapour, aerosols or spillage, and cleaning of equipment to be expected.		
	Filling lines specifically designed to both capture vapour and aerosol emissions and minimise spillage		
Aggaggman4 Mathad	ECETOC TRA Worker v2.0 with modifications		
Assessment Method	(see 1. General remarks)		
For further details on OCs and RMMs see Table 2 and Table 14			
1.5.1.2.8 Control of workers exposure for PROC 15			
Workers related free short title	Use as laboratory reagent		
	PROC 15		
Use descriptor covered	PROC 15		
Use descriptor covered Processes, tasks, activities covered	PROC 15 Use of substances at small scale laboratory (< 1 1 or 1 kg present at workplace). Larger laboratories and R+D installations should be treated as industrial processes.		
-	Use of substances at small scale laboratory (< 1 l or 1 kg present at workplace). Larger laboratories and R+D installations should be treated as		

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

Use of tightly fitting safety goggles

(The substance has shown to cause mucosal irritations at relatively high concentrations. Thus, it is recommended to protect the eyes).

1.6.2 Exposure Estimation

1.6.2.1. Workers exposure

For the estimated exposure for workers / PROC 1 see Table 15 For the estimated exposure for workers / PROC 2 see Table 16 For the estimated exposure for workers / PROC 3 see Table 5 For the estimated exposure for workers / PROC 4 see Table 6 For the estimated exposure for workers / PROC 5 see Table 17 For the estimated exposure for workers / PROC 8a see Table 7 For the estimated exposure for workers / PROC 8b see Table 8 For the estimated exposure for workers / PROC 9 see Table 18 For the estimated exposure for workers / PROC 15 see Table 9

Table 41: Estimated exposure for workers – PROC 6

Calculation tool used: ECETOC TRA 2.0 modified (see 1. General remarks)

Route of exposure	Concentrations		Justification
	Value	Unit	
Long-term exposure, systemic/local, inhalative	22.11	mg/m³	NA
Long-term exposure, systemic, dermal	2.74	mg/kg bw/d	NA

NA = Not applicable

1.6.2.2. Consumer exposure

Not applicable

1.6.2.3. Indirect exposure of humans via the environment (oral)

The bioaccumulation potential of this substance is very low, with a Kow of 0.0339; therefore, indirect exposure of humans via the environment can be considered negligible.

1.6.2.4. Environmental exposure

Table 42: Environmental Exposure Scenario ES6-E1

Section 1	Operational conditions and risk management measures
Section 1.2	Control of environmental exposure
Identifier*	ES6-E1
Contributing scenario	Production Of Polymers
Environmental Release Category	ERC6c
Specific ERC	ESVOC 43
Assessment scenario	
Operational Conditions	
Amounts used	
Amounts used in the EU (tonnes/year)	200,000 (total industry tonnage for use in production of polymers)
Fraction of EU tonnage used in region	1
Fraction of main source to local environment	0.075
Fraction of substance in end-use products	1
Maximum daily site tonnage (kg/day)	50,000
Frequency and duration of use	
Type of release	Continuous
Emission days (days/year)	300 - ESVOC 43
Site specific monitoring data results for surface water effluent	
Location of sample	
Environmental factors not influenced by risk management	
Local freshwater dilution factor	10 (default)
Local marine water dilution factor	100 (default)
Other given operational conditions affecting environmental exposure	
Risk Management Measures	
Technical conditions and measures at	
process level (source) to prevent release	
Technical onsite conditions and measures to reduce or limit discharges,	
air emissions and releases to soil	
Tract air amissions to provide a typical	
Treat air emissions to provide a typical removal efficiency of (%)	
Treat wastewater (prior to discharge to receiving water) to provide the required removal efficiency of (%) ETotal,RMM = $1 - ((1 - ERMM, 1) \times (1 - ERMM, 2))$	87%

Organizational measures to	
prevent/limit release from site	
Conditions and measures related to	
municipal sewage treatment plant	
Conditions and measures related to	
external treatment of waste for disposal	
Conditions and measures related to	
external recovery of waste	
Other environmental control measures	
additional to above	
Identifier	ES6-E1
Narrative	Release fraction derived from SpERC (ESVOC 43)
Release fraction to air from process	2.00E-03
Release fraction to wastewater from	1.00E-02
process	1.002 02
Release fraction to soil from process	1.00E-04
(regional only)	
Local release to air (kg/d)	1.00E+02
Local release to sewage (kg/d)	5.00E+02
Local release to soil (kg/d)	5.00E+00
Total efficiency of removal from	
wastewater after onsite and offsite	
(domestic treatment plant) RMMs (%)	
Total efficiency of removal from air	
emissions (%)	
The maximum allowable site tonnage	87,155
(M _{Safe}) based on removal from domestic	
sewage treatment (kg/d)	
Scaling	

The downstream user can check the compliance of his site by comparing site specific data with defaults used in the exposure assessment. The site specific quotient should be inferior or equal to the spERC quotient.

$$\frac{m_{\text{spERC}} * (1 - E_{\text{ER,spERC}}) * F_{\text{releasespERC}}}{DF_{\text{spERC}}} \ge \frac{m_{\text{site}} * (1 - E_{\text{ER,site}}) * F_{\text{releasesite}}}{DF_{\text{site}}}$$

 $\begin{array}{l} m_{spERC} \colon Substance \ use \ rate \ in \ spERC \\ E_{ER,spERC} \colon Efficacy \ of \ RMM \ in \ spERC \\ F_{release,,spERC} \colon \ Initial \ release \ fraction \ in \end{array}$

spERC

DF_{spERC}: dilution factor of STP effluent in

river

 m_{site} : Substance use rate at site $E_{ER,site}$: Efficacy of RMM at site

 $F_{release,,site}$: Initial release fraction at site DF_{site} : dilution factor of STP effluent in

river

1.6.2.4.1 Predicted exposure concentrations in the STP and in the aquatic compartments (freshwater, seawater and sediments)

Table 43: Predicted exposure concentrations in the STP and in the aquatic compartments (frshwater, seawater and sediments)

Local Concentration, Compartment: STP		
and aquatic	unit	ES6-E1
Local PEC in surface water during emission	mg/L	3.172E+00
episode (dissolved)		
Annual average local PEC in surface water	mg/L	2.608E+00
(dissolved)		
Local PEC in fresh water sediment during	mg/kg	1.199E+01
emission episode	dwt	
Local PEC in sea water during emission	mg/L	3.172E-01
episode		
Annual average local PEC in sea water	mg/L	2.608E-01
(dissolved)		
Local PEC in marine sediment during	mg/kg	1.199E+00
emission episode	dwt	
PEC for microorganisms in STP	mg/L	3.164E+01
Comments		

1.6.2.4.2 Predicted exposure concentration in soils

Table 44: Predicted exposure concentration in soils

Local Concentration, Compartment: soil	unit	ES6-E1
Local PEC in agricultural soil, averaged over 30 days	mg/kg dwt	1.216E-01
Local PEC agricultural soil, averaged over 180 days	mg/kg dwt	3.772E-02
Local PEC in grass land, averaged over 180 days	mg.kg dwt	1.907E-02
Comments		

1.6.2.4.3 Predicted exposure concentration in the atmospheric compartment

Table 45: Predicted exposure concentration in the atmospheris compartment

Local	Concentration,		
Compartment: a	air	unit	ES6-E1
Annual average (total)	local PEC in air	kg/m ³	2.285E-08
Comments			

1.6.2.4.4 Predicted exposure concentration in food for secondary poisoning

The bioaccumulation potential of this substance is very low, therefore secondary poisoning can be considered negligible. The Kow for DEG is 0.0339.

1.7 Use in Paints/Coatings (industrial)

General remarks

PROC 7:

ECETOC TRA generally is considered to be not suitable for the calculation of processes including aerosol generation. Thus, the inhalative exposure concerning the spraying process was evaluated using Stoffenmanager v4.0, whereas the dermal exposure was calculated with RISKOFDERM v2.1.

Regarding Stoffenmanager the 75th percentile was taken as the relevant exposure value. Regarding RISKOFDERM the 75th percentile of the "Exposure loading per shift body" was added with the 75th percentile of the "Exposure loading per shift hand". The values given in μ l was converted into mg and divided by a body weight of 70 kg which is generally assumed for workers. In addition, appropriate body protection was considered within the calculation of the final dermal exposure value.

1.7.1 Exposure Scenario 7

General Remarks

The relevant OCs used for calculation of environmental exposure are mentioned under paragraph 1.7.2.4.

Table 46: Description of ES 7

Table 40. Description of ES 7					
Reference Number	7				
1.7.1.1 Title					
Free short title Use in Paints/Coatings (industrial)					
Systematic title based on use descriptor	SU3;	J3; PROC 1, 2, 3, 4, 5, 7, 8a, 8b, 10, 13, and 15; ERC			
1.7.1.2 Operational conditions and Risk management measures					
1.7.1.2.1 Control of workers exposure for PROC 1					
Workers related free short title		Use in closed process, no likelihood of exposure			
Use descriptor covered		PROC 1			
Processes, tasks, activities covered		Use of the substance in high integrity contained system where little potential exists for exposures, e.g. any sampling via closed loop systems			
Assessment Method		ECETOC TRA Worker v2.0 with modifications			
		(see 1. General remarks)			
For further details on OCs and RMMs see Table 14					
1.7.1.2.2 Control of workers exposure for PROC 2					
Workers related free short title		Use in closed, continuous process with occasional controlled exposure			
Use descriptor covered		PROC 2			

Processes, tasks, activities covered	Continuous process but where the design philosophy is not specifically aimed at minimizing emissions. Occasional exposure will arise e.g.				
, ,	through maintenance, sampling and equipment breakages				
Assessment Method	ECETOC TRA Worker v2.0 with modifications				
	(see 1. General remarks)				
For further details on OCs and RMM					
1.7.1.2.3 Control of workers exposure					
Workers related free short title	Use in closed batch process (synthesis or formulation).				
workers related free short title	Use in batch and other process (synthesis) where opportunity for exposure arises.				
Use descriptor covered	PROC 3 and 4				
Processes, tasks, activities covered	Batch manufacture of a chemical or formulation where the predominant handling is in a contained manner, e.g. through enclosed transfers, but where some opportunity for contact with chemicals occurs, e.g. through sampling				
	Use in batch manufacture of a chemical where significant opportunity for exposure arises, e.g. during charging, sampling or discharge of material, and when the nature of the design is likely to result in exposure.				
Assessment Method	ECETOC TRA Worker v2.0 with modifications (see 1. General remarks)				
For further details on OCs and RMM	Is see Table 2				
1.7.1.2.4 Control of workers exposure	e for PROC 5				
Workers related free short title	Mixing or blending in batch processes fo formulation of preparations and article (multistage and/or significant contact).				
Use descriptor covered	PROC 5				
Processes, tasks, activities covered	Manufacture or formulation of chemical products or articles using technologies related to mixing and blending of solid or liquid materials, and where the process is in stages and provides the opportunity for significant contact at any stage				
Assessment Method	ECETOC TRA Worker v2.0 with modifications (see 1. General remarks)				
For further details on OCs and RMMs see Table 14					
1.7.1.2.5 Control of workers exposure for PROC 7					
Workers related free short title	Industrial spraying				
	1				

Use descriptor covered		PROC 7					
Processes, tasks, activities covered		Air dispersive techniques					
		Spraying for surface coating, adhesives, polishes/cleaners, air care products, sandblasting					
		Substances can be inhaled as aerosols. The energy of the aerosol particles may require advanced exposure controls; in case of coating, overspray may lead to waste water and waste.					
Assessment Method		Stoffenmanager v4.0 – Task: "Handling of liquids at high pressure resulting in substantial generation of mist or spray/haze" (inhalative exposure) RISKOFDERM v2.1 – Process: "Spraying" (dermal expsosure)					
Product characteristic							
Physical state		Liquid					
Fugacity		Low					
Concentration of substance		100			%		
Vapour pressure of the substance	0.008			hPa			
Amounts used							
Application rate	1 l/min	1			nmeter from KOFDERM		
Frequency and duration of use/exposure							
					rameter from SKOFDERM		
Duration of exposure		6	hours/day	du	(Limiting value; Assumed duration within Stoffenmanager: 4-8 hours)		
Frequency of exposure		4-5	days/week		rameter from offenmanager		
Human factors not influenced	l by risk	managei	ment				
Exposed skin surface		Whole body					
Other given operational cond	itions af	fecting w	orkers expo	sure			
Location		Inside					
Room volume		> 1000 m ³			Parameter from Stoffenmanager		
General ventilation		No general ventilation			Parameter from Stoffenmanager		
Work within one meter of the source		No					
Direction of spraying		Downward			Parameter from		
Direction of spraying		Downwa	ard		RISKOFDERM		

None							
Technical conditions and measures to control dispersion from source towards the							
Segregation Segregation	Ensure t m from the			that worker is > 1		Parameter from Stoffenmanager and RISKOFDERM	
Local exhaust ventilation (Direction of airflow away the worker)	from			Effectivene ss: ca. 50%	Sto	rameter from offenmanager and SKOFDERM	
Organisational measures to prevent /limit releases, dispersion and exposure							
Work area regularly cleaned			Yes	S		Parameter from Stoffenmanager	
Equipment regularly inspect cleaned	ted a	nd well	Yes	S		Parameter from Stoffenmanager	
Spray direction				vel		Parameter from RISKOFDERM	
Conditions and measures related to personal protection, hygiene and health evaluation							
Respiratory protection required	No		Parameter from Stoffenmanager				
Use of suitable gloves with basic training	Yes		Effe	Effectiveness: 90%		Relevant regarding exposure of the hands	
Wearing of appropriate working clothes (e.g. an overall)	Yes		Effectiveness: 80%		ó	Relevant regarding exposure of the body	
1.7.1.2.6 Control of workers exposure for PROC 8a							
Workers related free short title Tra (cha		Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities.					
Use descriptor covered PRC			PROC 8a				
Processes, tasks, activities covered		bagg rela	Sampling, loading, filling, transfer, dumping, bagging in non- dedicated facilities. Exposure related to dust, vapour, aerosols or spillage, and cleaning of equipment to be expected.				
Assessment Method			ECETOC TRA Worker v2.0 with modifications				
			(see 1. General remarks)				
For further details on OCs and RMMs see Table 2							
1.7.1.2.7 Control of workers exposure for PROC 8b							
Workers related free short title (c		(cha	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities.				

II d	DD OC 91				
Use descriptor covered	PROC 8b				
Processes, tasks, activities covered	Sampling, loading, filling, transfer, dumping bagging in dedicated facilities. Exposure related to dust, vapour, aerosols or spillage, and cleaning or equipment to be expected.				
Assessment Method	ECETOC TRA Worker v2.0 with modifications				
Assessment Method	(see 1. General remarks)				
For further details on OCs and RMM					
1.7.1.2.8 Control of workers exposure for PROC 10					
Workers related free short title	Roller application or brushing				
Use descriptor covered	PROC 10				
	Low energy spreading of	e.g. coatings			
Processes, tasks, activities covered	Including cleaning of surfaces. Substance can inhaled as vapours, skin contact can occur throu droplets, splashes, working with wipes a handling of treated surfaces.				
	ECETOC TRA Worker v2.0 with modifications				
Assessment Method	(see 1. General remarks)				
Product characteristic					
Physical state	Liquid				
Fugacity	Low				
Concentration of substance	100	%			
Vapour pressure of the substance	0.008 hPa				
Amounts used					
Not relevant					
Frequency and duration of use/expos	sure				
Duration of exposure	> 4 hours/day				
Frequency of exposure	≤ 240 days/year				
Human factors not influenced by risk management					
Exposed skin surface Both hands (960 cm²)					
Other given operational conditions affecting workers exposure					
Location	Indoor				
Domain	Industrial				
Technical conditions and measures at process level (source) to prevent release					
None	None				
Technical conditions and measures to control dispersion from source towards the worker					
Local exhaust ventilation required No					
Organisational measures to prevent /limit releases, dispersion and exposure					

Not relevant in ECETOC TRA							
Conditions and measures related to personal protection, hygiene and health evaluation							
Respiratory protection required	No						
Use of suitable gloves with basic training	Yes		Effectiveness: 90%				
1.7.1.2.9 Control of workers exposure for PROC 13							
Workers related free short title Tre		Treatment of articles by dipping and pouring.					
Use descriptor covered	Use descriptor covered PR		OC 13				
Processes, tasks, activities covered dip or voice of approaches as		Immersion operations. Treatment of articles by dipping, pouring, immersing, soaking, washing out or washing in substances; including cold formation or resin type matrix. Includes handling of treated objects (e.g. after dying, plating). Substance is applied to a surface by low energy techniques such as dipping the article into a bath or pouring a preparation onto a surface.					
Assessment Method		ECETOC TRA Worker v2.0 with modifications (see 1. General remarks)					
For further details on OCs and RMMs se		. `	· · · · · · · · · · · · · · · · · · ·				
1.7.1.2.10 Control of worker	s exposur	e for	PROC 15				
-		Use	Use as laboratory reagent				
Use descriptor covered			PROC 15				
Processes, tasks, activities co	Use of substances at small scale laboratory						
Assessment Method ECETOC TRA Worker v2.0 with modification (see 1. General remarks)							
For further details on OCs and RMMs see Table 2							

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

Use of tightly fitting safety goggles

(The substance has shown to cause mucosal irritations at relatively high concentrations. Thus, it is recommended to protect the eyes)

1.7.2 Exposure Estimation

1.7.2.1. Workers exposure

For the estimated exposure for workers / PROC 1 see Table 3
For the estimated exposure for workers / PROC 2 see Table 4
For the estimated exposure for workers / PROC 3 see Table 5
For the estimated exposure for workers / PROC 4 see Table 6
For the estimated exposure for workers / PROC 5 see Table 17
For the estimated exposure for workers / PROC 8a see Table 7
For the estimated exposure for workers / PROC 8b see Table 8
For the estimated exposure for workers / PROC 13 see Table 24
For the estimated exposure for workers / PROC 15 see Table 9

Table 47: Estimated exposure for workers – PROC 7

Calculation tool used: Stoffenmanager v4.0

Route of exposure	Concentrations		Justification
	Value Unit		
Long-term exposure, systemic/local, inhalative	0.84 mg/m³		75 th percentile
Long-term exposure, systemic, dermal	75.0	mg/kg bw/d	See 1.7: General remarks

NA = Not applicable

Table 48: Estimated exposure for workers – PROC 10

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Route of exposure	Concentrations		Concentrations		Concentrations		Justification
	Value Unit						
Long-term exposure, systemic/local, inhalative	44.21 mg/m³		NA				
Long-term exposure, systemic, dermal	2.74	mg/kg bw/d	NA				

NA = Not applicable

1.7.2.2. Consumer exposure

Not applicable

1.7.2.3. Indirect exposure of humans via the environment (oral)

The bioaccumulation potential of this substance is very low, with a Kow of 0.0339; therefore, indirect exposure of humans via the environment can be considered negligible.

1.7.2.4. Environmental exposure

Table 49: Environmental Exposure Scenario ES7-E1

Section 1	Operational conditions and risk management measures
Section 1.2	Control of environmental exposure
Identifier*	ES7-E1
Contributing scenario	Use In Paints/Coatings
Environmental Release Category	ERC4
Specific ERC	CEPE 16a
Assessment scenario	

Operational Conditions	
Amounts used	
Amounts used in the EU (tonnes/year)	9,561
, , ,	(maximum passing tonnage)
Fraction of EU tonnage used in region	1
Fraction of main source to local	1
environment	
Fraction of substance in end-use products	1
Maximum daily site tonnage (kg/day)	42,050
Frequency and duration of use	
Type of release	Continuous
Emission days (days/year)	220 - CEPE 16a
Site specific monitoring data results for	
surface water effluent	
Location of sample	
Environmental factors not influenced by	
risk management	
Local freshwater dilution factor	10 (default)
Local marine water dilution factor	100 (default)
Other given operational conditions	
affecting environmental exposure	
Risk Management Measures	
Technical conditions and measures at	
process level (source) to prevent release	
Technical onsite conditions and	
measures to reduce or limit discharges,	
air emissions and releases to soil	
Treat air emissions to provide a typical	
removal efficiency of (%)	
Treat wastewater (prior to discharge to	87%
receiving water) to provide the required	
removal efficiency of (%) ETotal,RMM =	
$1 - ((1 - ERMM, 1) \times (1 - ERMM, 2))$	
Organizational measures to	CEPE 16a - Wet scrubber or filtration
prevent/limit release from site	
Conditions and measures related to	
municipal sewage treatment plant	
Conditions and measures related to	
external treatment of waste for disposal	
Conditions and measures related to	
external recovery of waste	
Other environmental control measures	
additional to above	
Identifier	ES7-E1

Narrative	Release fraction derived from SpERC (CEPE
	16a)
Release fraction to air from process	9.80E-01
Release fraction to wastewater from	2.00E-02
process	
Release fraction to soil from process	0.00E+00
(regional only)	
Local release to air (kg/d)	4.26E+04
Local release to sewage (kg/d)	8.69E+02
Local release to soil (kg/d)	0.00E+00
Total efficiency of removal from	
wastewater after onsite and offsite	
(domestic treatment plant) RMMs (%)	
Total efficiency of removal from air	
emissions (%)	
The maximum allowable site tonnage	42,052
(M _{Safe}) based on removal from domestic	
sewage treatment (kg/d)	
Scaling	

The downstream user can check the compliance of his site by comparing site specific data with defaults used in the exposure assessment. The site specific quotient should be inferior or equal to the spERC quotient.

$$\frac{m_{\text{spERC}} * (1 - E_{\text{ER,spERC}}) * F_{\text{releasespERC}}}{DF_{\text{spERC}}} \ge \frac{m_{\text{site}} * (1 - E_{\text{ER,site}}) * F_{\text{releasesite}}}{DF_{\text{site}}}$$

 m_{spERC} : Substance use rate in spERC $E_{ER,spERC}$: Efficacy of RMM in spERC $F_{release,,spERC}$: Initial release fraction in

spERC

DF_{spERC}: dilution factor of STP effluent in

river

 m_{site} : Substance use rate at site $E_{ER,site}$: Efficacy of RMM at site

 $F_{release,,site}$: Initial release fraction at site DF_{site} : dilution factor of STP effluent in

river

1.7.2.4.1 Predicted exposure concentrations in the STP and in the aquatic compartments (freshwater, seawater and sediments)

Table 50: Predicted exposure concentrations in the STP and in the aquatic

compartments (freshwater, seawater and sediments)

Local Concentration, Compartment: STP		
and aquatic	unit	ES7-E1
Local PEC in surface water during emission	mg/L	5.349E+00
episode (dissolved)		
Annual average local PEC in surface water	mg/L	3.235E+00
(dissolved)		
Local PEC in fresh water sediment during	mg/kg	2.022E+01
emission episode	dwt	
Local PEC in sea water during emission	mg/L	5.350E-01
episode		
Annual average local PEC in sea water	mg/L	3.236E-01
(dissolved)		
Local PEC in marine sediment during	mg/kg	2.022E+00
emission episode	dwt	
PEC for microorganisms in STP	mg/L	5.322E+01
Comments		

1.7.2.4.2 Predicted exposure concentration in soils

Table 51: Predicted exposure concentration in soils

Local Concentration, Compartment: soil	unit	ES7-E1
Local PEC in agricultural soil, averaged over 30 days	mg/kg dwt	1.530E+00
Local PEC agricultural soil, averaged over 180 days	mg/kg dwt	1.389E+00
Local PEC in grass land, averaged over 180 days	mg.kg dwt	2.040E+00
Comments		

1.7.2.4.3 Predicted exposure concentration in the atmospheric compartment

Table 52: Predicted exposure concentration in the atmospheric compartment

Local Concentration,			
Compartment: a	uir	unit	ES7-E1
Annual average (total)	local PEC in air	kg/m ³	6.905E-06
Comments			

1.7.2.4.4 Predicted exposure concentration in food for secondary poisoning

The bioaccumulation potential of this substance is very low, therefore secondary poisoning can be considered negligible. The Kow for DEG is 0.0339.

1.8 Use in Paints/Coatings/Adhesives/ Sealants/ Foams/ Polymers/ filled Polymers (professional)

General remarks

PROC 11:

PROC 11:

As ECETOC TRA generally is considered to be not suitable for the calculation of processes including aerosol generation. Thus, the inhalative exposure concerning the spraying process was evaluated using Stoffenmanager v4.0; the dermal exposure was estimated using the RISKOFDERM model v2.1.

Regarding Stoffenmanager the 75th percentile was taken as the relevant exposure value. Regarding RISKOFDERM the 75th percentile of the "Exposure loading per shift body" was added with the 75th percentile of the "Exposure loading per shift hand". The values given in μ l was converted into mg and divided by a body weight of 70 kg which is generally assumed for workers. In addition, appropriate body protection was

considered within the calculation of the final dermal exposure value.

1.8.1 Exposure Scenario 8

General Remarks

The relevant OCs used for calculation of environmental exposure are mentioned under paragraph 9.8.2.4.

Table 53: Description of ES 8

Reference Number 8 1.8.1.1 Title				
Ţ				
I HYGG SHAYT TITIG	Use in Paints/Coatings/ Adhesives/ Sealants/ Foams/ Polymers/ filled Polymers (professional)			
	SU22; PROC 1, 2, 3, 4, 5, 8a, 8b, 9, 10, 11, 13, 14, 15, and 19; ERC 8d			
1.8.1.2 Operational conditions and	Risk management measures			
1.8.1.2.1Control of workers exposu	re for PROC 1, 2, 3			
Workers related free short title	Use in closed process, no likelihood of exposure. Use in closed, continuous process with occasional controlled exposure.			
	Use in closed batch process (synthesis or formulation).			
Use descriptor covered	PROC 1, 2, 3			
Processes, tasks, activities covered	Use of the substances in high integrity contained system where little potential exists for exposures, e.g. any sampling via closed loop systems. Continuous process but where the design			

	emissions. It is not high integrity and occasion expose will arise e.g. through maintenance sampling and equipment breakages.				. through maintenance,
	Batch manufacture of a chemic where the predominant handling manner, e.g. through enclosed trasome opportunity for contact occurs, e.g. through sampling.				nandling is in a contained losed transfers, but where contact with chemicals
Assessment Method					(v2.0) modified
Doe do et al ana et ariatia		(see 1. C	Genral remar	KS)	
Product characteristic		Liquid			
Physical state		Liquid			
Fugacity Concentration of substance		Low			0/
		100			% hDs
Vapour pressure of the substan	ice	0.008			hPa
Amounts used					
Not relevant					
Frequency and duration of u	se/exposi	1			
Duration of exposure			> 4 hours/day		
Frequency of exposure		≤ 240	days/year		
Human factors not influence	1				
Exposed skin surface		one hand (240 cm ²) Relevant for PROC 1 and 3			
-		two hands (480 cm²) Relevant for PROC 2			
Other given operational cond	litions af		orkers expo	sure	
Location		Indoor			
Domain		Professi	onal		
Technical conditions and me	asures at	process	level (source	e) to	prevent release
None					
Technical conditions and m worker	ieasures	to contr	ol dispersio	n fr	om source towards the
Local exhaust ventilation	No)			
Organisational measures to p	orevent /l	limit rele	ases, dispers	sion	and exposure
Not relevant for ECETOC TR	A				
Conditions and measures rel	ated to p	ersonal p	rotection, h	ygie	ne and health evaluation
Respiratory protection required	on No				
1.8.1.2.2 Control of workers	exposure	for PRO	C 4 and 5		
Workers related free short title Use in batch and other process (synthesis opportunity for exposure arises. Mixing or blending in batch process			arises.		

	formulation of preparations and articles (multistage and/or significant con-tact)				
Use descriptor covered	PROC 4 and 5				
	Use in batch manufacture of a chemical where significant opportunity for exposure arises, e.g. during charging, sampling or discharge of material, and when the nature of the design is likely to result in exposure.				
Processes, tasks, activities covered	Manufacture or formulation of chemical products or articles using technologies related to mixing and blending of solid or liquid materials, and where the process is in stages and provides the opportunity for significant con-tact at any stage.				
Assessment Method	ECETOC TRA Worker v	2.0 with modifications			
Assessment Method	(see 1. General remarks)				
Product characteristic					
Physical state	Liquid				
Fugacity	Low				
Concentration of substance	100	%			
Vapour pressure of the substance	0.008	hPa			
Amounts used					
Not relevant					
Frequency and duration of use/expos	sure				
Duration of exposure	>4	hours/day			
Frequency of exposure	≤ 240	days/year			
Human factors not influenced by risl	k management				
Palm of	both hands (480 cm ²)				
Other given operational conditions a	ffecting workers exposure	,			
Location	Indoor				
Domain	Professional				
Technical conditions and measures a	t process level (source) to	prevent release			
None					
Technical conditions and measures worker	to control dispersion fr	rom source towards the			
Local exhaust ventilation required No					
Organisational measures to prevent /limit releases, dispersion and exposure					
Not relevant in ECETOC TRA					
Conditions and measures related to personal protection, hygiene and health evaluation					
Respiratory protection required No					

Use of suitable gloves with	Yes		Ef	fectiveness: 9	90%	Relevant for PROC 5
basic training	No					Relevant for PROC 4
1.8.1.2.3 Control of workers exposure for PROC 8a						
Workers related free short title		Ti (c	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities.			
Use descriptor covered		P	PROC 8a			
Processes, tasks, activities covered		ba re	Sampling, loading, filling, transfer, dumping, bagging in non- dedicated facilities. Exposure related to dust, vapour, aerosols or spillage, and cleaning of equipment to be expected.			
Assessment Method		E	CETO	OC TRA Wo	rker v2	.0 with modifications
Assessment Method		(s	ee 1.	General Ren	narks)	
Product characteristic						
Physical state		Li	quid			
Fugacity		L	OW			
Concentration of substance		10	00			%
Vapour pressure of the substan	nce	0.	800			hPa
Amounts used						
Not relevant						
Frequency and duration of u	ıse/exp	osure				
Duration of exposure	Duration of exposure			rs		hours/day
Frequency of exposure		<u>≤</u>	≤ 240			days/year
Human factors not influence			0			
Exposed skin surface	Both	hands	(960 c	em²)	Relev	vant for PROC 8a
Other given operational con-	dition	s affec	ting v	vorkers exp	osure	
Location		In	door			
Domain		Pı	ofess	ional		
Technical conditions and me	asure	s at pr	ocess	level (sourc	e) to p	revent release
None						
Technical conditions and measures to control dispersion from source towards the worker						
Local exhaust ventilation requ	ired	Yes		Effectivene	ss: 80%	<u></u>
In case no LEV is present, a suitable respiratory protection with adequate effectiveness is required.						
Organisational measures to prevent /limit releases, dispersion and exposure						
Not relevant in ECETOC TRA						
Conditions and measures rel	ated t	o pers	onal j	protection, l	nygien	e and health evaluation
Respiratory protection	No					

required					
1.8.1.2.4 Control of workers exposure	for PROC 8b and 9				
Workers related free short title	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities. Transfer of substance or preparation into small containers (dedicated filling line, including				
Use descriptor covered	weighing). PROC 8b and 9				
Processes, tasks, activities covered	Sampling, loading, fill bagging in dedicated fact	ling, transfer, dumping, ilities. Exposure related to spillage, and cleaning of l.			
		designed to both capture emissions and minimise			
Assessment Method	ECETOC TRA Worker v	2.0 with modifications			
Assessment Method	(see 1. General remarks)				
Product characteristic	T	T			
Physical state	Liquid				
Fugacity	Low				
Concentration of substance	100	%			
Vapour pressure of the substance	0.008	hPa			
Amounts used					
Not relevant					
Frequency and duration of use/expos	ure	T			
Duration of exposure	> 4 hours	Hours/day			
Frequency of exposure	≤ 240	days/year			
Human factors not influenced by risk	management				
Exposed skin surface Palm of	both hands (480 cm ²)				
Other given operational conditions at	<u> </u>	,			
Location	Indoor				
Domain	Professional				
Technical conditions and measures at	process level (source) to	prevent release			
None					
Technical conditions and measures to control dispersion from source towards the worker					
Local exhaust ventilation required No.	0				
Organisational measures to prevent /	limit releases, dispersion	and exposure			
Not relevant in ECETOC TRA					

No No No No No No No No	Conditions and	l measures rel	ated to	perso	al protection	on, hygiene	and health evaluation
Workers related free short title Use descriptor covered PROC 10 Low energy spreading of e.g. coatings. Including cleaning of surfaces. Substance can be inhaled as vapours, skin contact can occur through droplets, splashes, working with wipes and handling of treated surfaces. Assessment Method Sec 1. General remarks) Product characteristic Physical state Liquid Fugacity Low Concentration of substance Usapours pressure of the substance Onomatis used Not relevant Frequency and duration of use/exposure Duration of exposure Duration of exposure Exposed skin surface Both hands (960 cm²) Other given operational conditions affecting workers exposure Location Domain Professional Technical conditions and measures at process level (source) to prevent release None Technical conditions and measures to control dispersion from source towards the worker Local exhaust ventilation required Yes Effectiveness: 80% In case no LEV is present, a suitable respiratory protection with adequate effectiveness is required Organisational measures to prevent /limit releases, dispersion and exposure Not relevant in ECETOC TRA Conditions and measures related to personal protection, hygiene and health evaluation	Respiratory required	protection	No				
Use descriptor covered PROC 10 Low energy spreading of e.g. coatings. Including cleaning of surfaces. Substance can be inhaled as vapours, skin contact can occur through droplets, splashes, working with wipes and handling of treated surfaces. Assessment Method ECETOC TRA Worker v2.0 with modifications (see 1. General remarks) Product characteristic Physical state Liquid Fugacity Low Concentration of substance 100 96 Vapour pressure of the substance Not relevant Frequency and duration of use/exposure Duration of exposure > 4 Hours/day Frequency of exposure Substance Substance	1.8.1.2.5 Contr	ol of workers	exposu	re for	PROC 10		
Low energy spreading of e.g. coatings. Including cleaning of surfaces. Substance can be inhaled as vapours, skin contact can occur through droplets, splashes, working with wipes and handling of treated surfaces. Assessment Method	Workers relate	ed free short ti	itle	Rol	ler application	on or brush	ing
cleaning of surfaces. Substance can be inhaled as vapours, skin contact can occur through droplets, splashes, working with wipes and handling of treated surfaces. Assessment Method Concentration Conce	Use descriptor	covered		PR	OC 10		
See 1. General remarks Product characteristic	Processes, tasks, activities covered		clea vap spla	Low energy spreading of e.g. coatings. Including cleaning of surfaces. Substance can be inhaled as vapours, skin contact can occur through droplets, splashes, working with wipes and handling of treated surfaces.			
(see 1. General remarks) Product characteristic	Assassment Ma	athod		EC	ETOC TRA	Worker v2.	0 with modifications
Physical state	Assessment ivi			(see	1. General	remarks)	
Fugacity Concentration of substance 100 Vapour pressure of the substance 0.008 hPa Amounts used Not relevant Frequency and duration of use/exposure Duration of exposure Duration of exposure Prequency of exposure Both hands (960 cm²) Other given operational conditions affecting workers exposure Location Indoor Domain Professional Technical conditions and measures at process level (source) to prevent release None Technical conditions and measures to control dispersion from source towards the worker Local exhaust ventilation required Yes Effectiveness: 80% In case no LEV is present, a suitable respiratory protection with adequate effectiveness is required Organisational measures to prevent /limit releases, dispersion and exposure Not relevant in ECETOC TRA Conditions and measures related to personal protection, hygiene and health evaluation	Product characteristic						
Concentration of substance Vapour pressure of the substance Vapour pressure of the substance O.008 Not relevant Frequency and duration of use/exposure Duration of exposure Duration of exposure → 4 Hours/day Frequency of exposure Human factors not influenced by risk management Exposed skin surface Both hands (960 cm²) Other given operational conditions affecting workers exposure Location Indoor Domain Professional Technical conditions and measures at process level (source) to prevent release None Technical conditions and measures to control dispersion from source towards the worker Local exhaust ventilation required Yes Effectiveness: 80% In case no LEV is present, a suitable respiratory protection with adequate effectiveness is required Organisational measures to prevent /limit releases, dispersion and exposure Not relevant in ECETOC TRA Conditions and measures related to personal protection, hygiene and health evaluation	Physical state			Liq	ıid		
Vapour pressure of the substance Amounts used Not relevant Frequency and duration of use/exposure Duration of exposure Duration of exposure Frequency of exposure Hours/day Gay/year Human factors not influenced by risk management Exposed skin surface Both hands (960 cm²) Other given operational conditions affecting workers exposure Location Indoor Domain Professional Technical conditions and measures at process level (source) to prevent release None Technical conditions and measures to control dispersion from source towards the worker Local exhaust ventilation required Yes Effectiveness: 80% In case no LEV is present, a suitable respiratory protection with adequate effectiveness is required Organisational measures to prevent /limit releases, dispersion and exposure Not relevant in ECETOC TRA Conditions and measures related to personal protection, hygiene and health evaluation	Fugacity			Lov	<i>I</i>		
Amounts used Not relevant Frequency and duration of use/exposure Duration of exposure > 4 Hours/day Frequency of exposure < 240 days/year Human factors not influenced by risk management Exposed skin surface Both hands (960 cm²) Other given operational conditions affecting workers exposure Location Indoor Domain Professional Technical conditions and measures at process level (source) to prevent release None Technical conditions and measures to control dispersion from source towards the worker Local exhaust ventilation required Yes Effectiveness: 80% In case no LEV is present, a suitable respiratory protection with adequate effectiveness is required Organisational measures to prevent /limit releases, dispersion and exposure Not relevant in ECETOC TRA Conditions and measures related to personal protection, hygiene and health evaluation	Concentration o	of substance		100		(2/0
Frequency and duration of use/exposure Duration of exposure > 4 Hours/day Frequency of exposure ≤ 240 days/year Human factors not influenced by risk management Exposed skin surface Both hands (960 cm²) Other given operational conditions affecting workers exposure Location Indoor Domain Professional Technical conditions and measures at process level (source) to prevent release None Technical conditions and measures to control dispersion from source towards the worker Local exhaust ventilation required Yes Effectiveness: 80% In case no LEV is present, a suitable respiratory protection with adequate effectiveness is required Organisational measures to prevent /limit releases, dispersion and exposure Not relevant in ECETOC TRA Conditions and measures related to personal protection, hygiene and health evaluation	Vapour pressure	e of the substar	nce	0.0	08	1	nPa
Prequency and duration of use/exposure Duration of exposure	Amounts used						
Duration of exposure	Not relevant						
Human factors not influenced by risk management Exposed skin surface Both hands (960 cm²) Other given operational conditions affecting workers exposure Location Indoor Domain Professional Technical conditions and measures at process level (source) to prevent release None Technical conditions and measures to control dispersion from source towards the worker Local exhaust ventilation required Yes Effectiveness: 80% In case no LEV is present, a suitable respiratory protection with adequate effectiveness is required Organisational measures to prevent /limit releases, dispersion and exposure Not relevant in ECETOC TRA Conditions and measures related to personal protection, hygiene and health evaluation	Frequency and	duration of u	se/exp	osure			
Human factors not influenced by risk management Exposed skin surface Both hands (960 cm²) Other given operational conditions affecting workers exposure Location Indoor Domain Professional Technical conditions and measures at process level (source) to prevent release None Technical conditions and measures to control dispersion from source towards the worker Local exhaust ventilation required Yes Effectiveness: 80% In case no LEV is present, a suitable respiratory protection with adequate effectiveness is required Organisational measures to prevent /limit releases, dispersion and exposure Not relevant in ECETOC TRA Conditions and measures related to personal protection, hygiene and health evaluation	Duration of exp	osure		> 4]	Hours/day
Other given operational conditions affecting workers exposure Location Indoor Domain Professional Technical conditions and measures at process level (source) to prevent release None Technical conditions and measures to control dispersion from source towards the worker Local exhaust ventilation required Yes Effectiveness: 80% In case no LEV is present, a suitable respiratory protection with adequate effectiveness is required Organisational measures to prevent /limit releases, dispersion and exposure Not relevant in ECETOC TRA Conditions and measures related to personal protection, hygiene and health evaluation	Frequency of ex	kposure		≤ 2	10	(days/year
Other given operational conditions affecting workers exposure Location							
Location	Exposed skin su	ırface	Both h	ands (9	60 cm ²)		
Technical conditions and measures at process level (source) to prevent release None Technical conditions and measures to control dispersion from source towards the worker Local exhaust ventilation required Yes Effectiveness: 80% In case no LEV is present, a suitable respiratory protection with adequate effectiveness is required Organisational measures to prevent /limit releases, dispersion and exposure Not relevant in ECETOC TRA Conditions and measures related to personal protection, hygiene and health evaluation	Other given op	erational con	ditions	affecti	g workers	exposure	
Technical conditions and measures at process level (source) to prevent release None Technical conditions and measures to control dispersion from source towards the worker Local exhaust ventilation required Yes Effectiveness: 80% In case no LEV is present, a suitable respiratory protection with adequate effectiveness is required Organisational measures to prevent /limit releases, dispersion and exposure Not relevant in ECETOC TRA Conditions and measures related to personal protection, hygiene and health evaluation	Location			Ind	oor		
Technical conditions and measures to control dispersion from source towards the worker Local exhaust ventilation required Yes Effectiveness: 80% In case no LEV is present, a suitable respiratory protection with adequate effectiveness is required Organisational measures to prevent /limit releases, dispersion and exposure Not relevant in ECETOC TRA Conditions and measures related to personal protection, hygiene and health evaluation	Domain			Pro	fessional		
Technical conditions and measures to control dispersion from source towards the worker Local exhaust ventilation required Yes Effectiveness: 80% In case no LEV is present, a suitable respiratory protection with adequate effectiveness is required Organisational measures to prevent /limit releases, dispersion and exposure Not relevant in ECETOC TRA Conditions and measures related to personal protection, hygiene and health evaluation	Technical cond	litions and me	asures	at pro	ess level (so	ource) to p	revent release
Local exhaust ventilation required Yes Effectiveness: 80% In case no LEV is present, a suitable respiratory protection with adequate effectiveness is required Organisational measures to prevent /limit releases, dispersion and exposure Not relevant in ECETOC TRA Conditions and measures related to personal protection, hygiene and health evaluation	None						
In case no LEV is present, a suitable respiratory protection with adequate effectiveness is required Organisational measures to prevent /limit releases, dispersion and exposure Not relevant in ECETOC TRA Conditions and measures related to personal protection, hygiene and health evaluation	Technical conc worker	ditions and n	1easur	es to c	ontrol dispo	ersion froi	n source towards the
Organisational measures to prevent /limit releases, dispersion and exposure Not relevant in ECETOC TRA Conditions and measures related to personal protection, hygiene and health evaluation	Local exhaust v	entilation requ	ired	Yes	Effectiv	veness: 80%	, o
Not relevant in ECETOC TRA Conditions and measures related to personal protection, hygiene and health evaluation	In case no LEV is present, a suitable respiratory protection with adequate effectiveness is required						
Conditions and measures related to personal protection, hygiene and health evaluation	Organisational measures to prevent /limit releases, dispersion and exposure						
	Not relevant in	Not relevant in ECETOC TRA					
Respiratory protection No	Conditions and measures related to personal protection, hygiene and health evaluation						
	Respiratory	protection	No				

required						
Use of suitable gloves with basic training	Yes		Effectiveness: 90%			
1.8.1.2.6 Control of workers	exposure	for PR	ROC	11		
Workers related free short t	itle	Non i	ndus	trial sprayin	g	
Use descriptor covered		PROC	C 11			
Processes, tasks, activities co	vered	Spray polish Substa	ving nes/cl	leaners, air c s can be inh	face care	products, sandblasting d as aerosols. The energy
				erosol partic controls.	eles	may require advanced
Assessment Method		at hig of mis	th prost or	essure result spray/haze"	ting	Task "Handling of liquids in substantial generation ocess "Spraying"
Product characteristic		KISK	.01 D	EIGHIVZ.1	11	occss ,,opraying
Physical state		Liquio	d			
Fugacity		Low				
Concentration of substance		100				%
Vapour pressure of the substar	nce	0.008	0.008		hPa	
Amounts used						
Application rate of product		0.05			L/min	
Frequency and duration of u	ıse/exposi	ure				
						rameter from ISKOFDERM
Duration of exposure		180	n	nins	dυ	imiting value; Assumed ration within offenmanager: 4-8 hours)
Frequency of exposure		4-5	4-5 days/week			rameter from offenmanager
Human factors not influence	ed by risk	manag	geme	ent		
Exposed skin surface		Whole	e boo	dy		
Other given operational con-	ditions af	fecting	wor	rkers exposi	ure	
Location		Inside				
Room volume		100 -1000 m ³			Parameter from Stoffenmanager	
General ventilation		Gener (mech		ventilation	on	Parameter from Stoffenmanager
Technical conditions and me	asures at	proces	ss lev	vel (source)	to	prevent release

Segregation	Vorker is v	vithin	one meter of		neter enmanager OFDERM	from and	
L Direction of airtiow	Not clearly away from the worker			Parameter from RISKOFDERM			
Technical conditions and worker	measures	to co	ntrol dispersi	on fro	m source tov	vards the	
Control measures		o con	trol measures		arameter toffenmanager	from	
Organisational measures t	Organisational measures to prevent /limit releases, dispersion and exposure						
Work area regularly cleaned			Yes		Parameter Stoffenmar	from nager	
Ensure that not more than or	ne worker is	s carry	ing out the task	at the	same time.		
Equipment regularly insp cleaned	ected and	well	Yes		Parameter Stoffenmar	from nager	
Spray direction			Level		Parameter RISKOFDI	from ERM	
Conditions and measures	elated to p	erson	al protection,	hygien	e and health e	evaluation	
Respiratory protectio required	n No						
Use of suitable gloves wit basic training	h Yes			Eff	ectiveness: 90°	0%	
Wearing of appropriat working clothes (e.g. an overall)	Yes			Eff	ectiveness: 80°	%	
1.8.1.2.7 Control of worker	s exposure	e for P	ROC 13 and 1	14			
		Trea	tment of article	es by di	pping and pou	ring.	
Workers related free short	title		Production of preparations or articles by tabletting, compression, extrusion, pelletisation.				
Use descriptor covered		PRO	PROC 13 and 14				
Processes, tasks, activities covered		Immersion operations. Treatment of articles by dipping, pouring, immersing, soaking, washing out or washing in substances; including cold formation or resin type matrix. Includes handling of treated objects (e.g. after dying, plating,). Substance is applied to a surface by low energy techniques such as dipping the article into a bath or pouring a preparation onto a surface. Use of the substances in high integrity contained system where little potential exists for exposures, e.g. any sampling via closed loop systems.					
Assessment Method		ECE	TOC TRA Wo	rker v2	2.0 with modifi	cations	

		(see 1. General remarks)					
Product characteristic		`	, , , , , , , , , , , , , , , , , , ,				
Physical state		Liq	uid				
Fugacity		Lov					
Concentration of substance		100)	2/0			
Vapour pressure of the substan	nce	0.0	08	hPa			
Amounts used							
Not relevant							
Frequency and duration of u	ıse/exposi	ure					
Duration of exposure		> 4]	Hours/day			
Frequency of exposure		≤ 2·	40	days/year			
Human factors not influence	ed by risk	mar	nagement				
Exposed body parts	Palm of b	ooth	hands (480 cm ²)				
Other given operational con-	ditions af	fecti	ng workers exposure				
Location		Ind	oor				
Domain		Professional					
Technical conditions and me	easures at	t process level (source) to prevent release					
None							
Technical conditions and n	neasures	to c	ontrol dispersion from	m source towards the			
Local exhaust ventilation requ	ired No)					
Organisational measures to	prevent /l	imit	releases, dispersion ar	nd exposure			
Not relevant in ECETOC TRA	A						
Conditions and measures rel	lated to p	erso	nal protection, hygiene	and health evaluation			
Respiratory protection required	No						
Lian of avitable alexag	Yes		Effectiveness: 90%	Relevant for PROC 13			
Use of suitable gloves	No			Relevant for PROC 14			
1.8.1.2.8Control of workers	exposure	for I	PROC 15				
Workers related free short t	itle	Use	e as laboratory reagent.				
Use descriptor covered			PROC 15				
Processes, tasks, activities covered		Use of substances at small scale laboratory (< 1 l or 1 kg present at workplace). Larger laboratories and R+D installations should be treated as industrial processes.					
Assessment Method		ECETOC TRA workers (v2.0) modified (see 1. General remarks)					

Product characteristic					
Physical state	Liquid				
Fugacity	Low				
Concentration of substance	100		%		
Vapour pressure of the substance	0.008		hPa		
Amounts used					
Not relevant					
Frequency and duration of use/expos	ure				
Duration of exposure	> 4	hours/day			
Frequency of exposure	≤ 240	days/year			
Human factors not influenced by risk	manage	ment			
Exposed skin surface Palm of	one hand	(240 cm ²)			
Other given operational conditions at	ffecting w	orkers exposure			
Location	Indoor				
Domain	Professi	onal			
Technical conditions and measures at	t process	level (source) to	prevent release		
None					
Technical conditions and measures worker	to contr	ol dispersion fr	om source towards the		
Local exhaust ventilation No.	0				
Organisational measures to prevent /	limit rele	ases, dispersion :	and exposure		
Not relevant for ECETOC TRA					
Conditions and measures related to p	ersonal p	orotection, hygie	ne and health evaluation		
Respiratory protection required No	personal p	protection, hygie	ne and health evaluation		
Respiratory protection No.			ne and health evaluation		
Respiratory protection required No	e for PRO	C 19	ne and health evaluation ate contact and only PPE		
Respiratory protection required No 1.8.1.2.9 Control of workers exposure	e for PRO	OC 19 ixing with intimate			
Respiratory protection required No 1.8.1.2.9 Control of workers exposure Workers related free short title	Hand-m availabl PROC 1 Address intention	oc 19 ixing with intimate 9 ies occupations nal contact with s			
Respiratory protection required 1.8.1.2.9 Control of workers exposure Workers related free short title Use descriptor covered	Hand-mavailable PROC 1 Address intention any specific	oc 19 ixing with intimate 9 ses occupations nal contact with serific exposure contact.	where intimate and substances occurs without		
Respiratory protection required 1.8.1.2.9 Control of workers exposure Workers related free short title Use descriptor covered Processes, tasks, activities covered	Hand-mavailable PROC 1 Address intention any specific	oc 19 ixing with intimate 9 ses occupations nal contact with serific exposure contact.	where intimate and substances occurs without atrols other than PPE.		
Respiratory protection required 1.8.1.2.9 Control of workers exposure Workers related free short title Use descriptor covered Processes, tasks, activities covered Assessment Method	Hand-mavailable PROC 1 Address intention any specific	oc 19 ixing with intimate 9 ses occupations nal contact with serific exposure contact.	where intimate and substances occurs without atrols other than PPE.		
Respiratory protection required 1.8.1.2.9 Control of workers exposure Workers related free short title Use descriptor covered Processes, tasks, activities covered Assessment Method Product characteristic	Hand-mavailable PROC 1 Address intention any specific ECETO	oc 19 ixing with intimate 9 ses occupations nal contact with serific exposure contact.	where intimate and substances occurs without atrols other than PPE.		
Respiratory required No 1.8.1.2.9 Control of workers exposure Workers related free short title Use descriptor covered Processes, tasks, activities covered Assessment Method Product characteristic Physical state	Hand-mavailable PROC 1 Address intention any specific ECETO	oc 19 ixing with intimate 9 ses occupations nal contact with serific exposure contact.	where intimate and substances occurs without atrols other than PPE.		

Amounts used						
Not relevant						
Frequency and duration of u	ıse/exposi	ıre				
Duration of exposure		< 15		minutes/day		
Frequency of exposure		≤ 240		days/year		
Human factors not influence	d by risk	manager	nen	t		
Exposed skin surface	Both han	ds and ma	in p	part of arms (1980 cm ²)		
Other given operational cond	ditions af	fecting w	ork	ers exposure		
Location		Indoor	ndoor			
Domain		Profession	onal			
Technical conditions and me	easures at	process l	eve	l (source) to prevent release		
None						
Technical conditions and n worker	neasures	to contro	ol d	lispersion from source towards the		
Local exhaust ventilation requ	ired No)				
Organisational measures to	prevent /l	imit relea	ises	, dispersion and exposure		
Not relevant in ECETOC TRA						
Conditions and measures related to personal protection, hygiene and health evaluation						
Respiratory protection required	No					
Use of suitable gloves	Yes	Yes Effectiveness: 90%				

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

Use of tightly fitting safety goggles

(The substance has shown to cause mucosal irritations at relatively high concentrations. Thus, it is recommended to protect the eyes)

1.8.2 Exposure Estimation

1.8.2.1. Workers exposure

Table 54: Estimated exposure for workers – PROC 1

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Route of exposure	Concentrations		Justification
	Value	Unit	
Long-term exposure, systemic/local, inhalative	0.04	mg/m³	NA

Long-term exposure, systemic, dermal	0.34	mg/kg bw/d	NA	
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NA = Not applicable

Table 55: Estimated exposure for workers – PROC 2

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Route of exposure	Concentrations		Justification
	Value	Unit	
Long-term exposure, systemic/local, inhalative	22.11	mg/m³	NA
Long-term exposure, systemic, dermal	1.37	mg/kg bw/d	NA

NA = Not applicable

Table 56: Estimated exposure for workers – PROC 3

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Route of exposure	Concentra	tions	Justification
	Value	Unit	
Long-term exposure, systemic/local, inhalative	13.27	mg/m³	NA
Long-term exposure, systemic, dermal	0.34	mg/kg bw/d	NA

NA = Not applicable

Table 57: Estimated exposure for workers – PROC 4

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Route of exposure	Concentrations		Justification
	Value	Unit	
Long-term exposure, systemic/local, inhalative	44.22	mg/m³	NA
Long-term exposure, systemic, dermal	6.86	mg/kg bw/d	NA

Table 58: Estimated exposure for workers – PROC 5

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Route of exposure	Concentrations		Justification
	Value	Unit	
Long-term exposure, systemic/local, inhalative	44.22	mg/m³	NA
Long-term exposure, systemic, dermal	13.71	mg/kg bw/d	NA

NA = Not applicable

Table 59: Estimated exposure for workers – PROC 8a

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Route of exposure	Concentrations		Justification
	Value	Unit	
Long-term exposure, systemic/local, inhalative	22.11	mg/m³	NA
Long-term exposure, systemic, dermal	13.71	mg/kg bw/d	NA

NA = Not applicable

Table 60: Estimated exposure for workers – PROC 8b

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Route of exposure	Concentrations		Justification
	Value	Unit	
Long-term exposure, systemic/local, inhalative	44.22	mg/m³	NA
Long-term exposure, systemic, dermal	6.86	mg/kg bw/d	NA

Table 61: Estimated exposure for workers – PROC 9

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Route of exposure	Concentrations		Justification
	Value	Unit	
Long-term exposure, systemic/local, inhalative	44.22	mg/m³	NA
Long-term exposure, systemic, dermal	6.86	mg/kg bw/d	NA

NA = Not applicable

Table 62: Estimated exposure for workers – PROC 10

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Route of exposure	Concentrations		Justification
	Value	Unit	
Long-term exposure, systemic/local, inhalative	22.11	mg/m³	NA
Long-term exposure, systemic, dermal	2.74	mg/kg bw/d	NA

NA = Not applicable

Table 63: Estimated exposure for workers – PROC 11

Calculation tool used: Stoffenmanager v4.0 and RISKOFDERMv2.1

Route of exposure	Concentrations		Justification
	Value	Unit	
Long-term exposure, systemic/local, inhalative	4.14	mg/m³	75 th percentile
Long-term exposure, systemic, dermal	64.70	mg/kg bw/d	75 th percentile (see 1.8 General remarks)

Table 64: Estimated exposure for workers – PROC 13

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Route of exposure	Concentrations		Justification
	Value	Unit	
Long-term exposure, systemic/local, inhalative	44.22	mg/m³	NA
Long-term exposure, systemic, dermal	1.37	mg/kg bw/d	NA

NA = Not applicable

Table 65: Estimated exposure for workers – PROC 14

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Route of exposure	Concentrations		Justification
	Value	Unit	
Long-term exposure, systemic/local, inhalative	44.22	mg/m³	NA
Long-term exposure, systemic, dermal	3.43	mg/kg bw/d	NA

NA = Not applicable

Table 66: Estimated exposure for workers – PROC 15

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Route of exposure	Concentrations		Justification
	Value	Unit	
Long-term exposure, systemic/local, inhalative	22.11	mg/m³	NA
Long-term exposure, systemic, dermal	0.34	mg/kg bw/d	NA

Table 67: Estimated exposure for workers – PROC 19

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Route of exposure	Concentrations		Justification
	Value	Unit	
Long-term exposure, systemic/local, inhalative	11.05	mg/m³	NA
Long-term exposure, systemic, dermal	14.14	mg/kg bw/d	NA

NA = Not applicable

1.8.2.2. Consumer exposure

Not applicable

1.8.2.3. Indirect exposure of humans via the environment (oral)

The bioaccumulation potential of this substance is very low, with a Kow of 0.0339; therefore, indirect exposure of humans via the environment can be considered negligible.

9.8.2.4. Environmental exposure

Table 68: Environmental Exposure Scenario ES8-E1

Section 1	Operational conditions and risk management measures
Section 1.2	Control of environmental exposure
Identifier*	ES8-E1
Contributing scenario	Use In Paints/Coatings
Environmental Release Category	ERC8d
Specific ERC	
Assessment scenario	
Operational Conditions	
Amounts used	
Amounts used in the EU (tonnes/year)	200,000 (total industry tonnage for use in production of polymers)
Fraction of EU tonnage used in region	0.1
Fraction of main source to local environment	0.002
Fraction of substance in end-use products	1
Maximum daily site tonnage (kg/day)	1,096
Frequency and duration of use	
Type of release	Continuous
Emission days (days/year)	365 – ERC8d

	· · · · · · · · · · · · · · · · · · ·
Site specific monitoring data results for	
surface water effluent	
Location of sample	
Environmental factors not influenced by	
risk management	
Local freshwater dilution factor	10 (default)
Local marine water dilution factor	100 (default)
Other given operational conditions	
affecting environmental exposure	
Risk Management Measures	
Technical conditions and measures at	
process level (source) to prevent release	
Technical onsite conditions and	
measures to reduce or limit discharges,	
air emissions and releases to soil	
Treat air emissions to provide a typical	
removal efficiency of (%)	
Treat wastewater (prior to discharge to	87%
receiving water) to provide the required	0/70
removal efficiency of (%) ETotal,RMM =	
$1 - ((1 - \text{ERMM}, 1) \times (1 - \text{ERMM}, 2))$	
Organizational measures to	
prevent/limit release from site	
Conditions and measures related to	
municipal sewage treatment plant	
Conditions and measures related to	
external treatment of waste for disposal	
Conditions and measures related to	
external recovery of waste	
·	
Other environmental control measures	
additional to above	
Identifier	ES8-E1
Narrative	Release fraction derived from ERC (8d)
Release fraction to air from process	1.00E+00
Release fraction to wastewater from	1.00E+00
process	
Release fraction to soil from process	2.00E-01
(regional only)	
Local release to air (kg/d)	1.10E+02
Local release to sewage (kg/d)	1.10E+02
Local release to soil (kg/d)	2.19E+01
Total efficiency of removal from	
wastewater after onsite and offsite	
(domestic treatment plant) RMMs (%)	
• • • · · · · · · · · · · · · · · · · ·	

Total efficiency of removal from air	
emissions (%)	
The maximum allowable site tonnage	
(M _{Safe}) based on removal from domestic	
sewage treatment (kg/d)	7,299

1.8.2.4.1 Predicted exposure concentrations in the STP and in the aquatic compartments (freshwater, seawater and sediments)

Table 69: Predicted exposure concentrations in the STP and in the aquatic compartments (freshwater, seawter and sediments)

Local Concentration, Compartment: STP		
and aquatic	unit	ES8-E1
Local PEC in surface water during emission	mg/L	8.301E-01
episode (dissolved)		
Annual average local PEC in surface water	mg/L	8.301E-01
(dissolved)		
Local PEC in fresh water sediment during	mg/kg	3.138E+00
emission episode	dwt	
Local PEC in sea water during emission	mg/L	8.284E-02
episode		
Annual average local PEC in sea water	mg/L	8.284E-02
(dissolved)		
Local PEC in marine sediment during	mg/kg	3.131E-01
emission episode	dwt	
PEC for microorganisms in STP	mg/L	6.935E+00
Comments		`

1.8.2.4.2 Predicted exposure concentration in soils

Table 70: Predicted exposure concnetration in soils

Local Concentration, Compartment: soil	unit	ES8-E1
Local PEC in agricultural soil, averaged over 30 days	mg/kg dwt	1.879E-01
Local PEC agricultural soil, averaged over 180 days	mg/kg dwt	1.695E-01
Local PEC in grass land, averaged over 180 days	mg.kg dwt	1.650E-01
Comments		

1.8.2.4.3 Predicted exposure concentration in the atmospheric compartment

Table 71: Predicted exposure concentration in the atmospheris compartment

Local	Concentration,		
Compartment: a	ir	unit	ES8-E1
Annual average (total)	local PEC in air	kg/m ³	1.083E-10
Comments			

1.8.2.4.4 Predicted exposure concentration in food for secondary poisoning

The bioaccumulation potential of this substance is very low, therefore secondary poisoning can be considered negligible. The Kow for DEG is 0.0339.

1.9 Use in Paints/Coatings /Surface treatment products (Consumer use)

General remarks

PC9a and PC15:

Regarding PC 9a and PC 15 two Sub-scenarios have been evaluated.

Sub-Scenario 1: Use in Paints/Coatings – non-spraying products (Water borne wall paint)

Sub-Scenario 2: Use in Paints/Coatings – spraying products

These Sub-Scenarios are intended to represent reasonable worst-case scenarios for PC9a and 15.

PC18:

To reflect a reasonable worst case scenario, the following assumptions have been made:

- An ink cartridge contains 50g of printing ink
- 50g printink ink are sufficient to print 300 pages

Generally, two steps have been assessed. Refilling of cartridges (Part A) and the printing process itself (Part B).

For the step "Refilling of toners" the ConsExpo default database for Cleaning and washing/All-purpose cleaner/Liquid/Mixing and Loading was regarded to be suitable as a basis for the inhalative and dermal exposure estimation (in case the ConsExpo default values have been used, this is stated below). Exposure via the oral route is anticipated to be not relevant.

The step "Printing process" was calculated using the evaporation model postulating instantaneous release as a worst case regarding inhalative exposure. With regard to the printing process dermal and oral exposure is considered to be negligible.

PC23 and 34:

It is assumed that the use of impregnation products for leather or textiles is covered within the scenarios described for PC 9a and 15. As DEG is a solvent which usually evaporated during or immediately after the application, a possible exposure to DEG by wearing/using impregnated products is considered to be neglible.

PC31:

For PC 31 the use of a floor/furniture polish reflects a representative worst case scenario.

1.9.1 Exposure Scenario

General Remarks

The relevant OCs used for calculation of environmental exposure are mentioned under paragraph 1.9.2.4.

Table 72 Description of the ES

Table 12 Description of the Lis		
Reference Number	9	
1.9.1.1. Title		
Free short title	Use in Paints/Coatings /Surface treatment products (Consumer use)	
Systematic title based on use descriptor	SU21; PC 9a, 15, 18, 23, 31 and 34; ERC 8d	
1.9.1.2. Operational conditions and risk management measures		

1.9.1.2.1 Control of consumer expo	sure for PC 9a and 15			
1.9.1.2.1.1 Sub-Scenario 1/Use in P	aints/Coatings - non-spr	aying products		
Name of contributing scenario	Use in Paints/Coating	Use in Paints/Coatings - non-spraying products		
	PC 9a, PC 15			
Use descriptor covered	PC 23 and 34 (Use o above (General reman	f impregnation products); see 'ks)		
Dungangan tanks activities account	see above (General R	emarks);		
Processes, tasks, activities covered	see corresponding Fa	ct Sheet ¹		
	ConsExpo 4.1			
Assessment Method		Based on the ConsExpo default database for Painting products/Brush and roller painting/Water borne wall paint		
Product characteristic				
Physical state	liquid			
Concentration of substance	max 10.0 %			
Vapour pressure of the substance	0.008 hPa			
Mol weight matrix of the product	45 g/mol	(Default value)		
		Thibodeaux's method;		
Mass transfer rate	0.277 m/min	(as stated in the corresponding Fact Sheet)		
Amounts used				
Applied amount	1250 g/day	(Default value)		
Frequency and duration of use/exp	osure			
Duration of exposure	132 min	(Default value)		
Duration of application	120 min	(Default value)		
Frequency of exposure	1day/year	(Default value – not relevant for the calculation of the mean concentration on day of exposure)		
Human factors not influenced by r	isk management			
Exposed skin surface	Hands and forearms (1900 cm ²)	S		
Contact rate	30 mg/min	(Default value)		
Release duration	7200 s	(Default value)		
Type of activity (inhalation rate)	Light activity	See footnote 2		
Other given operational conditions affecting consumers exposure				
Location	Inside			
Room volume	20 m³	(Default value)		
Ventilation rate	0.6 per hour	(Default value)		

Release area	10 m ²	(Default value)	
Application temperature	25°C	(=	
Conditions and measures related to information and behavioural advice to consumers			
Not applicable			
Conditions and measures related to p	ersonal protection and	hygiene	
Not applicable			
1.9.1.2.1.2 Sub-Scenario 2/Use in Pain	ts/Coatings - spraying	products	
Name of contributing scenario	Use in Paints/Coatings-	-spraying products	
Use descriptor covered	PC 9a, PC 15		
Processes, tasks, activities covered	see above (General Ren	marks);	
r rocesses, tasks, activities covered	see corresponding Fact	Sheet ¹	
	ConsExpo 4.1		
Assessment Method	Based on the ConsExpo default database for Painting products/Spray painting/Spray cans		
Product characteristic			
Physical state	Liquid		
Concentration of substance	max. 10.0 %		
Vapour pressure of the substance	0.008 hPa		
Airborn fraction	1		
Weight fraction non-volatile	0.3	(Default value)	
Density non-volatile	1.5 g/cm ³	(Default value)	
Amounts used			
Mass generation rate	0.33 g/s	(Default value)	
Frequency and duration of use/exposi	ıre		
Duration of spraying	15 min	(Default value)	
Duration of exposure	15 min	(Default value)	
Frequency of exposure	2 days/year	(Default value – not relevant for the calculation of the mean concentration on day of exposure)	
Human factors not influenced by risk	management		
Inhalation cut-off diameter	15 μm	(Default value)	
Non-respirable uptake fraction	1		
Exposed skin surface	Hands and forearms (1900 cm ²)		
Contact rate	100 mg/min	(Default value)	
Release duration	900 s	(Default value)	
Type of activity (inhalation rate)	Light activity	See footnote 2	

Other given operational conditions a	offecting consumers exp	osure		
Location	Inside			
Room volume	34 m³	(Default value)		
Room height	2.25 m	(Default value)		
Ventilation rate	1.5 per hour	(Default value)		
Application temperature	25°C			
Conditions and measures related to	information and behavi	ioural advice to consumers		
Spraying away from exposed person				
Conditions and measures related to	personal protection and	l hygiene		
Not applicable				
1.9.1.2.2 Control of consumer exposi	ure for PC 18			
Name of contributing scenario	Use in Printing inks			
Use descriptor covered	PC 18			
	Refilling of toners (ca	Refilling of toners (cartridges) – Part A;		
Processes, tasks, activities covered	Printing process – Par	t B:		
1 locesses, tasks, activities covered	Continuous printing of pages over a longer pof time			
	ConsExpo 4.1			
Assessment Method Refilling of toners: Based on the Co database for Cleaning and washing cleaner/Liquid/Mixing and Loading		g and washing/All-purpose		
	Printing process: Inhalation – evaporation model/instantaneous release			
Part A. Refilling step				
Product characteristic				
Physical state	Liquid			
Concentration of substance	max. 5%			
Vapour pressure of the substance	0,123 hPa			
Mol weight matrix	22 g/mol	High fraction of water is assumed		
Mass transfer rate	0.277 m/min	Thibodeaux's method;		
Amounts used	•			
Applied amount	50 g	Amount of printing ink contained in a cartridge See footnote 4		
Frequency and duration of use/expo	sure	<u>'</u>		
Duration of exposure	0.75 min	(Default value)		
Duration of application	0.3 min	(Default value)		
Frequency of exposure	365 days/year	Not relevant for the		

		calculation of the mean concentration on day of exposure)
Human factors not influenced by risk	management	
Evnosed skin surface	Palm of one hand	(Default value)
Exposed skin surface	(215 cm ²)	(Default value)
Type of activity (inhalation rate)	Light activity	See footnote 2
Other given operational conditions at	ffecting workers exposu	ıre
Location	Inside	
Room volume	-	A "personal volume" of 1 m³ is assumed
Ventilation rate	0.5 per hour	(Default value)
Release area	20 cm ²	(Default value)
Application temperature	25°C	
Conditions and measures related to in	nformation and behavio	oural advice to consumers
Not applicable		
Conditions and measures related to p	ersonal protection and	hygiene
Not applicable		
Part B. Printing process		
Product characteristic		
Physical state	Liquid	
Concentration of substance	max. 5%	
Vapour pressure of the substance	0,123 hPa	
Amounts used		
Applied amount	16.0 g/day	Amount of printing ink needed to print 300 pages
Frequency and duration of use/expos	ure	
Duration of exposure	600 mins	
Frequency of exposure	365 days/year	Not relevant for the calculation of the mean concentration on day of exposure)
Human factors not influenced by risk	management	
Type of activity (inhalation rate)	Light activity	See footnote 2
Other given operational conditions at	ffecting workers exposu	ire
Location	Inside	
Room volume	25 m³	See footnote 5
	25 m³ 0.6 per hour	See footnote 5 See footnote 6

Organisational measures to prevent	/limit releases, dispersio	n and exposure		
Not applicable				
Conditions and measures related to	personal protection, hyg	iene and health evaluation		
Not applicable				
1.9.1.2.3 Control of consumer expos	ure for PC 31			
Name of contributing scenario	Use in surface treatme products	ent products – non-spraying		
Use descriptor covered	PC 31			
Drogossos tasks activities acvored	see above (General Ren	marks);		
Processes, tasks, activities covered	see corresponding Fact	Sheet ⁷		
	ConsExpo 4.1			
Assessment Method		Based on the ConsExpo default database for Cleaning and washing/Floor carpet and furniture		
Product characteristic				
Physical state	Liquid	Liquid		
Concentration of substance	max 10 %	max 10 %		
Vapour pressure of the substance	0.008 hPa	0.008 hPa		
Mol weight matrix of the product	272 g/mol	(Default value)		
		Langmuirs method;		
Mass transfer rate	4660 m/min	(as stated in the corresponding Fact Sheet)		
Amounts used	•			
Applied amount	550 c/dox	(Default value)		
Applied amount	550 g/day	See footnote 8		
Frequency and duration of use/expo	osure			
Duration of exposure	240 min	(Default value)		
Duration of application	900 min	(Default value)		
Frequency of exposure	1day/year	(Default value – not relevant for the calculation of the mean concentration on day of exposure)		
Human factors not influenced by risk management				
Exposed skin surface	One hand or palm of both hands (430 cm ²)	(Default value)		
Contact rate	30 mg/min	(Default value)		
Release duration	7200 s	(Default value)		
Type of activity (inhalation rate)	Light activity	See footnote 2		
Other given operational conditions	affecting consumers expo	osure		

Location	Inside		
Room volume	58 m³	(Default value)	
Ventilation rate	0.5 per hour	(Default value)	
Release area	22 m²	(Default value)	
Application temperature	25°C		
Conditions and measures related to information and behavioural advice to consumers			
Not applicable			
Conditions and measures related to personal protection and hygiene			
Not applicable			

1.9.2 Exposure Estimation

1.9.2.1. Workers exposure

Not applicable.

1.9.2.2. Consumer exposure

General Remarks

PC18:

In order to reflect the worst case regarding the long-term inhalative and dermal exposure, the exposure resulting

from the refilling step and the printing process are added up.

Table 73: Estimated exposure for consumers / Contributing Scenario for PC9a and 15 Sub-Scenario 1/Use in Paints/Coatings – non-spraying products

Calculation tool used: ConsExpo 4.1

Route of exposure	dose / conc	Unit	Justification
Long-term exposure, systemic/local, inhalative	0.09	mg/m³	
Long-term exposure, systemic, dermal	5.54	mg/kg bw/d	
Long-term exposure, systemic, oral	NA	mg/kg bw/d	

Table 74: Estimated exposure for consumers / Contributing Scenario for PC9 and 15 Sub-Scenario 2/Use in Paints/Coatings - spraying products

Calculation tool used: ConsExpo 4.1

Route of exposure	dose / conc	Unit	Justification
Long-term exposure, systemic/local , inhalative	0.52	mg/m³	
Long-term exposure, systemic, dermal	2,31	mg/kg bw/d	
Long-term exposure, systemic, oral	0.26	mg/kg bw/d	

Table 75: Estimated exposure for consumers / Contributing Scenario for PC18

Calculation tool used: ConsExpo 4.1

Route of exposure	dose / conc	Unit	Justification
Part A. Refilling sto	Part A. Refilling step		
Long-term exposure, systemic/local, inhalative	NA	mg/m³	Extimated exposure value is regarded to be neglibible (2.55E-8 mg/m³)
Long-term exposure, systemic, dermal	0.007	mg/kg bw/d	
Part B. Printing pro	ocess		
Long-term exposure, systemic/local, inhalative	2.22	mg/m³	
Long-term exposure, systemic, dermal	NA	mg/kg bw/d	See general remarks 9.9.1
Combined exposure (Part A + Part B)			
Long-term exposure,	2.22	mg/m³	

systemic/local, inhalative			
Long-term exposure, systemic, dermal	0.007	mg/kg bw/d	

Table 76: Estimated exposure for consumers / Contributing Scenario for PC31

Calculation tool used: ConsExpo 4.1

Route of exposure	dose / conc	Unit	Justification
Long-term exposure, systemic/local, inhalative	0.05	mg/m³	
Long-term exposure, systemic, dermal	8.46	mg/kg bw/d	

1.9.2.3. Indirect exposure of humans via the environment (oral)

The bioaccumulation potential of this substance is very low, with a Kow of 0.0339; therefore, indirect exposure of humans via the environment can be considered negligible.

1.9.2.4. Environmental exposure

The environmental exposure assessment for this scenario is covered under the environmental assessment for Exposure Scenario 8 (Use in Paints/Coatings/ Adhesives/ Sealants/ Foams/ Polymers/ filled Polymers (professional)) in Section 1.8.2.4.

1.10 Use in Cleaning agents (industrial)

General remarks

<u>PROC 7:</u>

See 1.7

1.10.1 Exposure Scenario 10

General Remarks

The relevant OCs used for calculation of environmental exposure are mentioned under paragraph 1.10.2.4.

Table 77: Description of ES 10

Table //: Description of ES 10		
Reference Number	10	
1.10.1.1 Title		
Free short title	Use in Cleaning agents (industrial)	
Systematic title based on use descriptor	SU3; PROC 1, 2, 3, 4, 7, 8a, 8b, 10, and 13; ERC 4	
1.10.1.2 Operational conditions a	and Risk management measures	
1.10.1.2.1 Control of workers exp	posure for PROC 1	
Workers related free short title	Use in closed process, no likelihood of exposure	
Use descriptor covered	PROC 1	
Processes, tasks, activities covere	Use of the substance in high integrity contained system where little potential exists for exposures, e.g. any sampling via closed loop systems	
Aggaggment Mathod	ECETOC TRA Worker v2.0 with modifications	
Assessment Method	(see 1. General remarks)	
For further details on OCs and l	RMMs see Table 14	
1.10.1.2.2 Control of workers exposure for PROC 2		
Workers related free short title	Use in closed, continuous process with occasional controlled exposure	
Use descriptor covered	PROC 2	
Processes, tasks, activities covere	Continuous process but where the design philosophy is not specifically aimed at minimizing emissions. Occasional exposure will arise e.g. through maintenance, sampling and equipment breakages	
Assessment Method	ECETOC TRA Worker v2.0 with modifications	
Assessment Method	(see 1. General remarks)	
For further details on OCs and RMMs see Table 14		
1.10.1.2.3 Control of workers exposure for PROC 3 and 4		

_	T	
Workers related free short title	Use in closed batch process (synthesis or formulation).	
workers related free short title	Use in batch and other process (synthesis) where opportunity for exposure arises.	
Use descriptor covered	PROC 3 and 4	
Processes tasks activities covered	Batch manufacture of a chemical or formulation where the predominant handling is in a contained manner, e.g. through enclosed transfers, but where some opportunity for contact with chemicals occurs, e.g. through sampling	
Processes, tasks, activities covered	Use in batch manufacture of a chemical where significant opportunity for exposure arises, e.g. during charging, sampling or discharge of material, and when the nature of the design is likely to result in exposure.	
A management Mode of	ECETOC TRA Worker v2.0 with modifications	
Assessment Method	(see 1. General remarks)	
For further details on OCs and RMM	Is see Table 2	
1.10.1.2.4 Control of workers exposure for PROC 7		
Workers related free short title Industrial spraying		
Use descriptor covered	PROC 7	
Processes, tasks, activities covered	Air dispersive techniques Spraying for surface coating, adhesives, polishes/cleaners, air care products, sandblasting Substances can be inhaled as aerosols. The energy of the aerosol particles may require advanced exposure controls; in case of coating, overspray	
Assessment Method	may lead to waste water and waste.	
Assessment Method For further details on OCs and RMM	Stoffenmanager v4.0	
1.10.1.2.5 Control of workers exposure		
1.10.1.2.3 Control of workers exposur		
Workers related free short title	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities.	
Use descriptor covered	PROC 8a	
Processes, tasks, activities covered	Sampling, loading, filling, transfer, dumping, bagging in non- dedicated facilities. Exposure related to dust, vapour, aerosols or spillage, and	
	cleaning of equipment to be expected.	
Assassment Mathed		
Assessment Method	cleaning of equipment to be expected.	

1.10.1.2.6 Control of workers exposu		
Workers related free short title	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities.	
Use descriptor covered	PROC 8b	
Processes, tasks, activities covered	Sampling, loading, filling, transfer, dumping, bagging in dedicated facilities. Exposure related to dust, vapour, aerosols or spillage, and cleaning of equipment to be expected.	
	ECETOC TRA Worker v2.0 with modifications	
Assessment Method	(see 1. General remarks)	
For further details on OCs and RMM	1s see Table 2	
1.10.1.2.7 Control of workers exposu	re for PROC 10	
Workers related free short title Roller application or brushing		
Use descriptor covered	PROC 10	
	Low energy spreading of e.g. coatings	
Processes, tasks, activities covered	Including cleaning of surfaces. Substance can be inhaled as vapours, skin contact can occur through droplets, splashes, working with wipes and handling of treated surfaces.	
	ECETOC TRA Worker v2.0 with modifications	
Assessment Method	(see 1. General remarks)	
For further details on OCs and RMM	Is see Table 46	
1.10.1.2.8 Control of workers exposu	re for PROC 13	
Workers related free short title	Treatment of articles by dipping and pouring.	
Use descriptor covered	PROC 13	
Processes, tasks, activities covered	Immersion operations. Treatment of articles by dipping, pouring, immersing, soaking, washing out or washing in substances; including cold formation or resin type matrix. Includes handling of treated objects (e.g. after dying, plating). Substance is applied to a surface by low energy techniques such as dipping the article into a bath or pouring a preparation onto a surface.	
Assessment Method	ECETOC TRA Worker v2.0 with modifications	
Assessment Method	(see 1. General remarks)	
For further details on OCs and RMMs see Table 23		

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

Use of tightly fitting safety goggles

(The substance has shown to cause mucosal irritations at relatively high concentrations.

Thus, it is recommended to protect the eyes)

1.10.2 Exposure Estimation

1.10.2.1. Workers exposure

For the estimated exposure for workers / PROC 1 see Table 15
For the estimated exposure for workers / PROC 2 see Table 16
For the estimated exposure for workers / PROC 3 see Table 5
For the estimated exposure for workers / PROC 4 see Table 6
For the estimated exposure for workers / PROC 7 see Table 47
For the estimated exposure for workers / PROC 8a see Table 7
For the estimated exposure for workers / PROC 8b see Table 8
For the estimated exposure for workers / PROC 10 see Table 48
For the estimated exposure for workers / PROC 13 see Table 24

1.10.2.2. Consumer exposure

Not applicable

1.10.2.3. Indirect exposure of humans via the environment (oral)

The bioaccumulation potential of this substance is very low, with a Kow of 0.0339; therefore, indirect exposure of humans via the environment can be considered negligible.

1.10.2.4. Environmental exposure

Table 78: Environmental Exposure Scenario ES10-E1

Section 1	Operational conditions and risk
	management measures
Section 1.2	Control of environmental exposure
Identifier*	ES10-E1
Contributing scenario	Use In Cleaning Agents
Environmental Release Category	ERC4
Specific ERC	AISE 13
Assessment scenario	
Operational Conditions	
Amounts used	
Amounts used in the EU (tonnes/year)	200,000 (total industry tonnage for use in production of polymers)
Fraction of EU tonnage used in region	1
Fraction of main source to local environment	0.000055
Fraction of substance in end-use products	1
Maximum daily site tonnage (kg/day)	50
Frequency and duration of use	

Type of release	Continuous
Emission days (days/year)	220 - AISE 13
Site specific monitoring data results for	
surface water effluent	
Location of sample	
Environmental factors not influenced by	
risk management	
Local freshwater dilution factor	10 (default)
Local marine water dilution factor	100 (default)
Other given operational conditions	
affecting environmental exposure	
Risk Management Measures	
Technical conditions and measures at	
process level (source) to prevent release	
TL.:-1:4- 1'4'	
Technical onsite conditions and measures to reduce or limit discharges,	
air emissions and releases to soil	
an emissions and releases to son	
Treat air emissions to provide a typical	
removal efficiency of (%)	
Treat wastewater (prior to discharge to	87%
receiving water) to provide the required	0770
removal efficiency of (%) ETotal,RMM =	
$1 - ((1 - ERMM, 1) \times (1 - ERMM, 2))$	
Organizational measures to	
prevent/limit release from site	
Conditions and measures related to	
municipal sewage treatment plant	
Conditions and measures related to	
external treatment of waste for disposal	
Conditions and measures related to external recovery of waste	
<u> </u>	
Other environmental control measures	
additional to above	FG10 F1
Identifier	ES10-E1
Narrative	Release fraction derived from SpERC (AISE
Dalance fraction to air from angeles	13)
Release fraction to air from process	0.00E+00
Release fraction to wastewater from process	1.00E+00
Release fraction to soil from process	0.00E+00
(regional only)	0.00L+00
Local release to air (kg/d)	0.00E+00
Local release to sewage (kg/d)	5.00E+01
Local release to soil (kg/d)	0.00E+00
Local foliation to soft (Rg/u)	0.001.00

Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	
Total efficiency of removal from air emissions (%)	
The maximum allowable site tonnage (M_{Safe}) based on removal from domestic sewage treatment (kg/d)	284
Cagling	

Scaling

The downstream user can check the compliance of his site by comparing site specific data with defaults used in the exposure assessment. The site specific quotient should be inferior or equal to the spERC quotient.

$$\frac{m_{\text{spERC}}^{*}(1-E_{\text{ER,spERC}})*F_{\text{releasespERC}}}{DF_{\text{spERC}}} \ge \frac{m_{\text{site}}*(1-E_{\text{ER,site}})*F_{\text{releasesite}}}{DF_{\text{site}}}$$

 m_{spERC} : Substance use rate in spERC $E_{ER,spERC}$: Efficacy of RMM in spERC

 $F_{release,,spERC} \hbox{:} \quad Initial \quad release \quad fraction \quad in \quad$

spERC

DF_{spERC}: dilution factor of STP effluent in

river

 m_{site} : Substance use rate at site $E_{ER,site}$: Efficacy of RMM at site

 $F_{release,,site}$: Initial release fraction at site DF_{site} : dilution factor of STP effluent in

river

1.10.2.4.1 Predicted exposure concentrations in the STP and in the aquatic compartments (freshwater, seawater and sediments)

Table 79: Predicted exposure concentrations in the STP and in the aquatic compartments (freshwater, seawater and sediments)

Local Concentration, Compartment: STP		
and aquatic	unit	ES10-E1
Local PEC in surface water during emission episode (dissolved)	mg/L	9.744E-01
Annual average local PEC in surface water (dissolved)	mg/L	8.487E-01
Local PEC in fresh water sediment during emission episode	mg/kg dwt	3.684E+00

Local PEC in sea water during emission episode	mg/L	9.452E-02
Annual average local PEC in sea water (dissolved)	mg/L	8.195E-02
Local PEC in marine sediment during emission episode	mg/kg dwt	3.573E-01
	dwt	3.573E-01 3.164E+00

1.10.2.4.2 Predicted exposure concentration in soils

Table 80: Predicted exposure concentration in soils

Local Concentration, Compartment: soil	unit	ES10-E1
Local PEC in agricultural soil, averaged over 30 days	mg/kg dwt	1.160E-02
Local PEC agricultural soil, averaged over 180 days	mg/kg dwt	3.210E-03
Local PEC in grass land, averaged over 180 days	mg.kg dwt	1.118E-03
Comments		

1.10.2.4.3 Predicted exposure concentration in the atmospheric compartment

Table 81: Predicted exposure concentration in the atmospheric compartment

Local	Concentration,		
Compartment: a	ir	unit	ES10-E1
Annual average (total)	local PEC in air	kg/m ³	1.353E-13
Comments			

1.10.2.4.4 Predicted exposure concentration in food for secondary poisoning

The bioaccumulation potential of this substance is very low, therefore secondary poisoning can be considered negligible. The Kow for DEG is 0.0339.

1.11 Use in Cleaning agents (Professional Use)

General remarks

PROC 11: See 1.8

1.11.1 Exposure Scenario 11

General Remarks

The relevant OCs used for calculation of environmental exposure are mentioned under paragraph 1.11.2.4.

Table 82: Description of ES 11

Reference Number	11		
1.11.1.1 Title	33333 3333 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3		
Free short title	Use in Cleaning agents (professional)		
	Ose in Cleaning agents (professionar)		
Systematic title based on use descriptor	SU22; PROC 1, 2, 3, 4, 8a, 8b, 10, 11, and 13; ERC 8a		
1.11.1.2 Operational conditions and Risk management measures			
1.11.1.2.1Control of workers exposure for PROC 1, 2, 3			
	Use in closed process, no likelihood of exposure.		
Workers related free short title	Use in closed, continuous process with occasional controlled exposure.		
	Use in closed batch process (synthesis or formulation).		
Use descriptor covered	PROC 1, 2, 3		
	Use of the substances in high integrity contained system where little potential exists for exposures, e.g. any sampling via closed loop systems.		
Processes, tasks, activities covere	Continuous process but where the design philosophy is not specifically aimed at minimizing emissions. It is not high integrity and occasional expose will arise e.g. through maintenance, sampling and equipment breakages.		
	Batch manufacture of a chemical or formulation where the predominant handling is in a contained manner, e.g. through enclosed transfers, but where some opportunity for contact with chemicals occurs, e.g. through sampling.		
Assessment Method	ECETOC TRA workers (v2.0) modified (see 1. Genral remarks)		
For further details on OCs and RMMs see Table 53			

1.11.1.2.2 Control of workers exposure for PROC 4		
Workers related free short title	Use in batch and other process (synthesis) where opportunity for exposure arises.	
Use descriptor covered	PROC 4	
Processes, tasks, activities covered	Use in batch manufacture of a chemical who significant opportunity for exposure arises, eduring charging, sampling or discharge material, and when the nature of the design likely to result in exposure.	
Assessment Method	ECETOC TRA Worker v2.0 with modifications (see 1. General remarks)	
For further details on OCs and RMM	,	
1.11.1.2.3 Control of workers exposur	re for PROC 8a	
Workers related free short title	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities.	
Use descriptor covered	PROC 8a	
Processes, tasks, activities covered	Sampling, loading, filling, transfer, dumping, bagging in non- dedicated facilities. Exposure related to dust, vapour, aerosols or spillage, and cleaning of equipment to be expected.	
A second on A Models of	ECETOC TRA Worker v2.0 with modifications	
Assessment Method	(see 1. General Remarks)	
For further details on OCs and RMM	Is see Table 53	
1.11.1.2.4 Control of workers exposur	re for PROC 8b	
Workers related free short title	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities.	
Use descriptor covered	PROC 8b	
Processes, tasks, activities covered	Sampling, loading, filling, transfer, dumping, bagging in dedicated facilities. Exposure related to dust, vapour, aerosols or spillage, and cleaning of equipment to be expected.	
Assessment Method	ECETOC TRA Worker v2.0 with modifications (see 1. General remarks)	
(see 1. General remarks) For further details on OCs and RMMs see Table 53		
1.11.1.2.5 Control of workers exposure for PROC 10		
Workers related free short title	Roller application or brushing	
Use descriptor covered	PROC 10	
Processes, tasks, activities covered	Low energy spreading of e.g. coatings. Including	

	cleaning of surfaces. Substance can be inhaled as vapours, skin contact can occur through droplets, splashes, working with wipes and handling of treated surfaces.	
A AMALI	ECETOC TRA Worker v2.0 with modifications	
Assessment Method	(see 1. General remarks)	
For further details on OCs and RMMs see Table 53		
1.11.1.2.6 Control of workers exposu	re for PROC 11	
Workers related free short title	Non industrial spraying	
Use descriptor covered	PROC 11	
	Air dispersive techniques	
Processes, tasks, activities covered	Spraying for surface coating, adhesives, polishes/cleaners, air care products, sandblasting	
	Substances can be inhaled as aerosols. The energy of the aerosol particles may require advanced exposure controls.	
Assessment Method	Stoffenmanager v4.0 and RISKOFDERMv2.1	
For further details on OCs and RMMs see Table 53		
1.11.1.2.7 Control of workers exposur	re for PROC 13	
Workers related free short title	Treatment of articles by dipping and pouring.	
Use descriptor covered	PROC 13	
Processes, tasks, activities covered	Immersion operations. Treatment of articles by dipping, pouring, immersing, soaking, washing out or washing in substances; including cold formation or resin type matrix. Includes handling of treated objects (e.g. after dying, plating,). Substance is applied to a surface by low energy techniques such as dipping the article into a bath or pouring a preparation onto a surface.	
Assessment Method	ECETOC TRA Worker v2.0 with modifications	
AND CONTROL TACKET	(see 1. General remarks)	
For further details on OCs and RMMs see Table 53		

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

Use of tightly fitting safety goggles

(The substance has shown to cause mucosal irritations at relatively high concentrations. Thus, it is recommended to protect the eyes)

1.11.2 Exposure Estimation

1.11.2.1. Workers exposure

For the estimated exposure for workers / PROC 1 see Table 10 For the estimated exposure for workers / PROC 2 see Table 11 For the estimated exposure for workers / PROC 3 see Table 12 For the estimated exposure for workers / PROC 4 see Table 13 For the estimated exposure for workers / PROC 8a see Table 15 For the estimated exposure for workers / PROC 8b see Table 16 For the estimated exposure for workers / PROC 10 see Table 18 For the estimated exposure for workers / PROC 11 see Table 19 For the estimated exposure for workers / PROC 13 see Table 20

1.11.2.2. Consumer exposure

Not applicable

1.11.2.3. Indirect exposure of humans via the environment (oral)

The bioaccumulation potential of this substance is very low, with a Kow of 0.0339; therefore, indirect exposure of humans via the environment can be considered negligible.

1.11.2.4. Environmental exposure

Table 83: Environmental Exposure Scenario ES11-E1

Section 1	Operational conditions and risk management measures
Section 1.2	Control of environmental exposure
Identifier*	ES11-E1
Contributing scenario	Use In Cleaning Agents
Environmental Release Category	ERC8a
Specific ERC	
Assessment scenario	
Operational Conditions	
Amounts used	
Amounts used in the EU (tonnes/year)	200,000
	(total industry tonnage for use in production of polymers)
Fraction of EU tonnage used in region	0.1
Fraction of main source to local environment	0.002
Fraction of substance in end-use products	1
Maximum daily site tonnage (kg/day)	1,096
Frequency and duration of use	
Type of release	Continuous
Emission days (days/year)	365 – ERC8a

	Г
Site specific monitoring data results for	
surface water effluent	
Location of sample	
Environmental factors not influenced by	
risk management	
Local freshwater dilution factor	10 (default)
Local marine water dilution factor	100 (default)
Other given operational conditions	
affecting environmental exposure	
Risk Management Measures	
Technical conditions and measures at	
process level (source) to prevent release	
Technical onsite conditions and	
measures to reduce or limit discharges,	
air emissions and releases to soil	
an omissions and releases to son	
Treat air emissions to provide a typical	
removal efficiency of (%)	
Treat wastewater (prior to discharge to	87%
receiving water) to provide the required	
removal efficiency of (%) ETotal,RMM =	
$1 - ((1 - ERMM, 1) \times (1 - ERMM, 2))$	
Organizational measures to	
prevent/limit release from site	
Conditions and measures related to	
municipal sewage treatment plant	
Conditions and measures related to	
external treatment of waste for disposal	
Conditions and measures related to	
external recovery of waste	
Other environmental control measures	
additional to above	
Identifier	ES11-E1
Narrative	Release fraction derived from ERC (8a)
Release fraction to air from process	1.00E+00
Release fraction to wastewater from	1.00E+00
process	1.00E+00
1	0.005±00
Release fraction to soil from process	0.00E+00
(regional only)	1.100+02
Local release to air (kg/d)	1.10E+02
Local release to sewage (kg/d)	1.10E+02
Local release to soil (kg/d)	0.00E+00
Total efficiency of removal from	
wastewater after onsite and offsite	
(domestic treatment plant) RMMs (%)	

Total efficiency of removal from air	
emissions (%)	
The maximum allowable site tonnage	7,387
(M _{Safe}) based on removal from domestic	
sewage treatment (kg/d)	

1.11.2.4.1 Predicted exposure concentrations in the STP and in the aquatic compartments (freshwater, seawater and sediments)

Table 84: Predicted exposure concentrations in the STP and in the aquatic compartments (freshwater, seawater and sediments)

Local Concentration, Compartment: STP		
and aquatic	unit	ES11-E1
Local PEC in surface water during emission	mg/L	8.202E-01
episode (dissolved)		
Annual average local PEC in surface water	mg/L	8.202E-01
(dissolved)		
Local PEC in fresh water sediment during	mg/kg	3.100E+00
emission episode	dwt	
Local PEC in sea water during emission	mg/L	8.191E-02
episode		
Annual average local PEC in sea water	mg/L	8.191E-02
(dissolved)		
Local PEC in marine sediment during	mg/kg	3.096E-01
emission episode	dwt	
PEC for microorganisms in STP	mg/L	6.935E+00
Comments		

1.11.2.4.2 Predicted exposure concentration in soils

Table 85: Predicted exposure concentration in soils

Local Concentration, Compartment: soil	unit	ES11-E1
Local PEC in agricultural soil, averaged over 30 days	mg/kg dwt	1.877E-01
Local PEC agricultural soil, averaged over 180 days	mg/kg dwt	1.693E-01
Local PEC in grass land, averaged over 180 days	mg.kg dwt	1.647E-01
Comments		

1.11.2.4.3 Predicted exposure concentration in the atmospheric compartment

Table 86: Predicted exposure concentration in the atmospheric compartment

Local	Concentration,		
Compartment: a	uir	unit	ES11-E1
Annual average (total)	local PEC in air	kg/m ³	1.081E-10
Comments			

1.11.2.4.4 Predicted exposure concentration in food for secondary poisoning

The bioaccumulation potential of this substance is very low, therefore secondary poisoning can be considered negligible. The Kow for DEG is 0.0339.

1.12. Use in Cleaning agents (Consumer use)

General remarks

In order to assess products included in PC35, the following three Sub-Scenarios have been calculated.

Sub-Scenario 1: Use in All-purpose cleaners - non-spraying products

Sub-Scenario 2: Use in All-purpose cleaner/spraying products

Sub-Scenario 3: Use in Floor cleaning products

These Sub-Scenarios are intended to represent resonable worst case scenarios for PC35.

Sub-Scenario 1:

Sub-Scenario 1 consists of two parts.

Part A considers the mixing and loading step in which the concentrated cleaner liquid is diluted with water; Part B considers the application of this solution. As a worst case scenario it was assumed that the concentrated cleaner liquid is diluted in a ratio of 1:5.

Sub-Scenario 2:

Sub-Scenario 2 consits of two parts.

Part A considers the spraying step, whereas Part B refers to the application step.

Sub-Scenario 1:

Sub-Scenario 1 consists of two parts.

Part A considers the mixing and loading step in which the concentrated cleaner liquid is diluted with water; Part B considers the application of this solution. As a worst case scenario it was assumed that the concentrated cleaner liquid is diluted in a ratio of 1:10.

1.12.1. Exposure Scenario 12

General Remarks

The relevant OCs used for calculation of environmental exposure are mentioned under paragraph 1.12.2.4.

Table 87: Description of the ES 12

Table 87: Description of the ES 12			
Reference Number	12		
1.12.1.1. Title			
Free short title	Use in Cleaning agents (Consumer use)		
Systematic title based on use descriptor	SU2	1; PC 35; ERC 8a	
1.12.1.2. Operational conditions	and r	isk management measu	ıres
1.12.1.2.1 Control of consumer e	1.12.1.2.1 Control of consumer exposure for PC 35		
1.12.1.2.1.1 Sub-Scenario 1/Use i	n All-	purpose cleaners - non	a-spraying products
Name of contributing scenario		Use in All-purpose products	cleaners – non-spraying
Use descriptor covered		PC 35	
Processes, tasks, activities covere	' ⁴	see above (General Ren	narks);
1 10ccsses, tasks, activities covere	u	see corresponding Fact	Sheet
		ConsExpo 4.1	
Assessment Method		Based on the ConsExpo default database for Cleaning and Washing/All-purpose cleanrs/Liquid	
Part A. Mixing and Loading			
Product characteristic			
Physical state		liquid	
Concentration of substance		max 20 %	
Vapour pressure of the substance	_	0.008 hPa	
Mol weight matrix of the product		22 g/mol	(Default value)
			Langmuirs method
Mass transfer rate		3660 m/min	(as stated in the corresponding Fact Sheet)
Amounts used			•
Applied amount		500 g/day	(Default value – refers to half of the bottle content)
			See footnote 2
Frequency and duration of use/e	xposu	re	
Duration of exposure		0.75 min	(Default value)
Duration of application		0.3 min	(Default value)
_ = =			<u>'</u>

Frequency of exposure	104 days/year	(Default value – not relevant for the calculation of the mean concentration on day of exposure)
Human factors not influenced by r	isk management	
Exposed skin surface	Palm of one hand (215 cm²)	(Default value)
Type of activity (inhalation rate)	Light activity	See footnote 5
Other given operational conditions	affecting consumers ex	posure
Location	Inside	
Room volume		A "personal volume" of 1 m³ is assumed
Ventilation rate	0.5 per hour	(Default value)
Release area	20 cm ²	(Default value)
Application temperature	25°C	
Conditions and measures related to	o information and beha	vioural advice to consumers
Not applicable		
Conditions and measures related to	o personal protection ar	nd hygiene
Not applicable		
Part B. Application		
Product characteristic		
Physical state	Liquid	
Concentration of substance	Max. 4 %	
Vapour pressure of the substance	0.008 hPa	
Mol weight matrix of the product	18 g/mol	(Default value)
-		Langmuirs method
Mass transfer rate	3660 m/min	(as stated in the corresponding Fact Sheet)
Amounts used	·	
Applied amount	400 g/day	(Default value) See footnote 3
Frequency and duration of use/exp	osure	•
Duration of exposure	240 min	(Default value)
Duration of application	20 min	(Default value)
Frequency of exposure	104 days/year	(Default value – not relevant for the calculation of the mean concentration on day of exposure)

Human factors not influenced by ris	k management			
Exposed skin surface	Palm of one hand	(D - f 14 1)		
	(215 cm ²)	(Default value)		
Type of activity (inhalation rate)	Light activity	See footnote 5		
Other given operational conditions a	affecting consumers ex	posure		
Location	Inside			
Room volume	58 m³	(Default value)		
Ventilation rate	0.5 per hour	(Default value)		
Release area	10 m ²	(Default value)		
Application temperature	25°C			
Conditions and measures related to	information and behav	vioural advice to consumers		
Not applicable				
Conditions and measures related to	personal protection an	d hygiene		
Not applicable				
1.12.1.2.1.2 Sub-Scenario 2/Use in A	ll-purpose cleaners - sp	oraying products		
Name of contributing scenario	Use in All-purpose c	Use in All-purpose cleaners – spraying products		
Use descriptor covered	PC 35			
	see above (General R	see above (General Remarks);		
Processes, tasks, activities covered	see corresponding Fa	ct Sheet		
	ConsExpo 4.1			
Assessment Method	Based on the ConsExpo default database fo Cleaning and Washing/All-purpose cleanrs/Spraying			
Part A. Spraying	1 0			
Product characteristic				
Physical state	Liquid			
Concentration of substance	max 5 %			
Vapour pressure of the substance	0.008 hPa			
Airborn fraction	0.2	(Default value)		
Weight fraction non-volatile	0.05	(Default value)		
Density non-volatile	1.8 g/cm ³	(Default value)		
Amounts used				
Mass generation rate	0.78 g/s	(Default value)		
Frequency and duration of use/expo	sure			
Duration of spraying	0.41 min	(Default value)		
Duration of exposure	60 min	(Default value)		
Frequency of exposure	365 days/year	(Default value – not relevant for the		

		calculation of the mean concentration on day of exposure)	
Human factors not influenced by risk	management		
Inhalation cut-off diameter	15 μm	(Default value)	
Non-respirable uptake fraction	1	(Default value)	
Exposed skin surface	Hands and forearms (1900 cm ²)		
Contact rate	46 mg/min	(Default value)	
Release duration	2.6 s	(Default value)	
Type of activity (inhalation rate)	Light activity	See footnote 5	
Other given operational conditions at	ffecting consumers expo	osure	
Location	Inside		
Room volume	15 m³	(Default value)	
Room height	2.5 m	(Default value)	
Ventilation rate	2.5 per hour	(Default value)	
Application temperature	25°C		
Conditions and measures related to in	nformation and behavio	oural advice to consumers	
Spraying away from exposed person			
Conditions and measures related to p	ersonal protection and	hygiene	
Not applicable			
Part B. Cleaning			
Product characteristic			
Physical state	Liquid		
Concentration of substance	max. 5 %		
Vapour pressure of the substance	0.008 hPa		
Mol weight matrix of the product	22 g/mol	(Default value)	
Mass transfer rate	3660 m/min	Langmuirs method (as stated in the corresponding Fact Sheet)	
Amounts used			
Applied amount	16.2 g/day	(Default value) See footnote 4	
Frequency and duration of use/exposure			
Duration of exposure	60 min	(Default value)	
Duration of application	10 min	(Default value)	
Frequency of exposure	365 days/year	(Default value – not relevant for the calculation of the mean	

		concentration on day of exposure)
Human factors not influenced by risk	k management	
Exposed skin surface	Palm of one hand (215 cm ²)	(Default value)
Type of activity (inhalation rate)	Light activity	See footnote 5
Other given operational conditions a	ffecting consumers exp	osure
Location	Inside	
Room volume	15 m³	(Default value)
Ventilation rate	2.5 per hour	(Default value)
Release area	1.71 m ²	(Default value)
Application temperature	25°C	
Conditions and measures related to i	nformation and behavio	oural advice to consumers
Not applicable		
Conditions and measures related to p	personal protection and	hygiene
Not applicable		
1.12.1.2.1.3 Sub-Scenario 3/Use in Flo	oor cleaning products	
Name of contributing scenario	Use in Floor cleaning products	
Use descriptor covered	PC 35	
B (1 (*****)	see above (General Re	marks);
Processes, tasks, activities covered	see corresponding Fact Sheet ¹	
	ConsExpo 4.1	
Assessment Method	Based on the ConsExpo default database for Cleaning and Washing/Floor, carpet and furniture products/Floor cleaning liquid	
Part A. Mixing and Loading		
Product characteristic		
Physical state	Liquid	
Concentration of substance	max 4 %	
Vapour pressure of the substance	0.008 hPa	
Mol weight matrix of the product	22 g/mol	(Default value)
Mass transfer rate	3660 m/min	Langmuirs method (as stated in the corresponding Fact Sheet)
Amounts used		
Applied amount	500 g/day	(Default value – refers to half of the bottle content) See footnote 2

Frequency and duration of use/exp	osure		
Duration of exposure	0.75 min	(Default value)	
Duration of application	0.3 min	(Default value)	
Frequency of exposure	104 days/year	(Default value – not relevant for the calculation of the mean concentration on day of exposure)	
Human factors not influenced by ri	isk management		
Exposed skin surface	Palm of one hand (215 cm ²)	(Default value)	
Type of activity (inhalation rate)	Light activity	See footnote 5	
Other given operational conditions	affecting consumers ex	posure	
Location	Inside		
Room volume		A "personal volume" of 1 m³ is assumed	
Ventilation rate	1 per hour	(Default value)	
Release area	20 cm ²	(Default value)	
Application temperature	25°C		
Conditions and measures related to	o information and beha	vioural advice to consumers	
Not applicable			
Conditions and measures related to	personal protection ar	nd hygiene	
Not applicable			
Part B. Application			
Product characteristic			
Physical state	Liquid		
Concentration of substance	Max. 4.0 %		
Vapour pressure of the substance	0.008 hPa		
Mol weight matrix of the product	18 g/mol	(Default value)	
		Langmuirs method	
Mass transfer rate	3660 m/min	(as stated in the corresponding Fact Sheet)	
Amounts used			
Applied amount	880 g/day	(Default value)	
		See footnote 3	
Frequency and duration of use/exposure			
Duration of exposure	240 min	(Default value)	
Duration of application	30 min	(Default value)	

Frequency of exposure	104 days/year	(Default value – not relevant for the calculation of the mean concentration on day of exposure)	
Human factors not influenced by risk	k management		
Exmagad akin ayufaaa	Palm of one hand	(Default value)	
Exposed skin surface	(215 cm^2)	(Default value)	
Type of activity (inhalation rate)	Light activity	See footnote 5	
Other given operational conditions affecting consumers exposure			
Location	Inside		
Room volume	58 m³	(Default value)	
Ventilation rate	0.5 per hour	(Default value)	
Release area	22 m²	(Default value)	
Application temperature	25°C		
Conditions and measures related to information and behavioural advice to consumers			
Not applicable			
Conditions and measures related to personal protection and hygiene			
Not applicable			

1.12.2 Exposure Estimation

1.12.2.1. Workers exposure

Not applicable.

1.12.2.2. Consumer exposure

General Remarks

All Sub-Scenarios consists of two parts (Part A: Mixing and Loading and Part B: Application or Part A: Spraying and Part B Cleaning). To calculate the exposure resulting in each Sub-Scenario the exposure estimates resulting from Part A and Part B are added.

Table 88: Estimated exposure for consumers / Contributing Scenario for PC35

Sub-Scenario 1/Use in All-purpose cleaners – non-spraying products

Calculation tool used: ConsExpo 4.1

Route of exposure	dose / conc	Unit	Justification	
Part A. Mixing and Loading				
Long-term exposure, systemic/local, inhalative	0.0007	mg/m³		
Long-term exposure, systemic, dermal	0.03	mg/kg bw/d		
Long-term, exposure, systemic, oral	NA	mg/kg bw/d		
Part B. Application	l			
Long-term exposure, systemic/local, inhalative	0.03	mg/m³		
Long-term exposure, systemic, dermal	11.70	mg/kg bw/d		
Long-term, exposure, systemic, oral	NA	mg/kg bw/d		
Part A and B. Mixing/Loading and Application				
Long-term exposure, systemic/local, inhalative	0.03	mg/m³		
Long-term exposure, systemic, dermal	11.73	mg/kg bw/d		

NA = Not applicable

Table 89: Estimated exposure for consumers / Contributing Scenario for PC35

Sub-Scenario 2/Use in All-purpose cleaners – spraying products

Calculation tool used: ConsExpo 4.1

Route of exposure	dose / conc	Unit	Justification	
Part A. Spraying				
Long-term exposure, systemic/local, inhalative	NA	mg/m³	Extimated exposure value is regarded to be neglibible (1,1E-5 mg/m³)	
Long-term exposure, systemic, dermal	0.01	mg/kg bw/d		
Long-term exposure, systemic, oral	NA	mg/kg bw/d	Estimated exposure value is regarded to be negligible (0.0006 mg/kg bw/day)	
Part B. Cleaning				
Long-term exposure, systemic/local, inhalative	0.008	mg/m³		
Long-term exposure, systemic, dermal	0.12	mg/kg bw/d		
Long-term exposure, systemic, oral	NA	mg/kg bw/d		
Part A and B. Spra	ying and Cleaning	5		
Long-term exposure, systemic/local, inhalative	0.008	mg/m³		
Long-term exposure, systemic, dermal	0.13	mg/kg bw/d		

NA = Not applicable

Table 90: Estimated exposure for consumers / Contributing Scenario for PC35 Sub-Scenario 3/Use in Floor cleaning products

Calculation tool used: ConsExpo 4.1

Route of exposure	dose / conc	Unit	Justification	
Part A. Mixing and Loading				
Long-term exposure, systemic/local, inhalative	NA	mg/m³	Extimated exposure value is regarded to be neglibible (0.0001 mg/m³)	
Long-term exposure, systemic, dermal	0.008	mg/kg bw/d		
Long-term exposure, systemic, oral	NA	mg/kg bw/d		
Part B. Application	1			
Long-term exposure, systemic/local, inhalative	0.05	mg/m³		
Long-term exposure, systemic, dermal	14.6	mg/kg bw/d		
Long-term exposure, systemic, oral	NA	mg/kg bw/d		
Part A and B. Mixi	ng/Loading and A	pplication		
Long-term exposure, systemic/local, inhalative	0.05	mg/m³		
Long-term exposure, systemic, dermal	14.6	mg/kg bw/d		

NA = Not applicable

1.12.2.3. Indirect exposure of humans via the environment (oral)

The bioaccumulation potential of this substance is very low, with a Kow of 0.0339; therefore, indirect exposure of humans via the environment can be considered negligible.

1.12.2.4. Environmental exposure

The environmental exposure scenario is covered under the environmental assessment for Use in Cleaning agents (professional) in Section 1.11.2.4.

1.13 Use in Biocidal products (Consumer use)

1.13.1 Exposure Scenario 13

General Remarks

The ConsExpo default database scenario "Disinfectants for use indoor" was chosen as a representative scenario for the Product Category. The scenario consists of two parts (Part A: Spraying and Part B: Wiping). To calculate the exposure resulting in each Sub-Scenario the exposure estimates resulting from Part A and Part B are added. The relevant OCs used for calculation of environmental exposure are mentioned under paragraph 1.13.2.4.

Table 91: Description of the ES 13

Reference Number	13		
1.13.1.1. Title	I		
Free short title Use		in Biocidal products (Co	onsumer use)
Systematic title based on use descriptor		1; PC 8; ERC 8d	
1.13.1.2. Operational conditions	and r	isk management meas	ures
1.12.1.2.1 Control of consumer e	xposı	ure for PC 8	
Name of contributing scenario		Use in Biocidal produc	ets
Use descriptor covered		PC 8	
B 4 1 4: 14:	•	see above (General Re	marks);
Processes, tasks, activities covere	ed	see corresponding Fact	Sheet
		ConsExpo 4.1	
Assessment Method		Based on the ConsExpo default database for Disinfectants/Disinfectants for indoor use	
Part A. Spraying			
Part A. Spraying			
Part A. Spraying Product characteristic			
1 0		Liquid	
Product characteristic		Liquid max 10 %	
Product characteristic Physical state		-	
Product characteristic Physical state Concentration of substance		max 10 %	(Default value)
Product characteristic Physical state Concentration of substance Vapour pressure of the substance		max 10 % 0.008 hPa	(Default value)
Product characteristic Physical state Concentration of substance Vapour pressure of the substance Airborn fraction		max 10 % 0.008 hPa 0.2	(Default value) (Default value)
Product characteristic Physical state Concentration of substance Vapour pressure of the substance Airborn fraction Weight fraction non-volatile		max 10 % 0.008 hPa 0.2 0.8	
Product characteristic Physical state Concentration of substance Vapour pressure of the substance Airborn fraction Weight fraction non-volatile Density non-volatile		max 10 % 0.008 hPa 0.2 0.8	
Product characteristic Physical state Concentration of substance Vapour pressure of the substance Airborn fraction Weight fraction non-volatile Density non-volatile Amounts used	exposi	max 10 % 0.008 hPa 0.2 0.8 1.8 g/cm ³	(Default value)
Product characteristic Physical state Concentration of substance Vapour pressure of the substance Airborn fraction Weight fraction non-volatile Density non-volatile Amounts used Mass generation rate	exposi	max 10 % 0.008 hPa 0.2 0.8 1.8 g/cm ³	(Default value)

requency of exposure 365 days/year		(Default value – not relevant for the calculation of the mean concentration on day of exposure)	
Human factors not influenced by ris	k management		
Inhalation cut-off diameter	15 μm	(Default value)	
Non-respirable uptake fraction	1	(Default value)	
Exposed skin surface	Hands and forearms (1900 cm ²)		
Contact rate	46 mg/min	(Default value)	
Release duration	2.6 s	(Default value)	
Type of activity (inhalation rate)	Light activity	See footnote 2	
Other given operational conditions a	affecting consumers expo	osure	
Location	Inside		
Room volume	15 m³	(Default value)	
Room height	2.5 m	(Default value)	
Ventilation rate	2.5 per hour	our (Default value)	
Application temperature 25°C			
Conditions and measures related to	information and behavio	oural advice to consumers	
Spraying away from exposed person			
Conditions and measures related to	personal protection and	hygiene	
Not applicable			
Part B. Wiping			
Product characteristic			
Physical state	Liquid		
Concentration of substance max. 10 %			
Vapour pressure of the substance	0.008 hPa		
Amounts used			
Applied amount	0.02 g/day (Default value)		
Frequency and duration of use/expo	sure		
Frequency of exposure	(Default value – relevant for calculation of the reconcentration on day exposure)		
Human factors not influenced by ris	k management		
Exposed skin surface	Palm of one hand	(Default value)	
Laposed skill surface	(215 cm ²)	(Delaun value)	
		·	

Other given operational conditions affecting consumers exposure				
Location	Inside			
Application temperature	25°C			
Conditions and measures related to information and behavioural advice to consumers				
Not applicable				
Conditions and measures related to personal protection and hygiene				
Not applicable				

1.13.2 Exposure Estimation

1.13.2.1. Workers exposure

Not applicable.

1.13.2.2. Consumer exposure

General Remarks

The scenario consists of two parts (Part A: Mixing and Loading and Part B: Application or Part A: Spraying and Part B Cleaning). To calculate the exposure resulting in each Sub-Scenario the exposure estimates resulting from Part A and Part B are added.

Table 92: Estimated exposure for consumers / Contributing Scenario for PC8

Calculation tool used: ConsExpo 4.1

Route of exposure	dose / conc	Unit	Justification		
Part A. Spraying	Part A. Spraying				
Long-term exposure, systemic/local, inhalative	0.001	mg/m³			
Long-term exposure, systemic, dermal	0.04	mg/kg bw/d			
Long-term exposure, systemic, oral	0.005	mg/kg bw/d			
Part B. Wiping	Part B. Wiping				
Long-term exposure, systemic/local, inhalative	NA	mg/m³			

Long-term exposure, systemic, dermal	0.03	mg/kg bw/d	
Long-term exposure, systemic, oral	NA	mg/kg bw/d	
Part A and B. Spraying and Cleaning			
Long-term exposure, systemic/local, inhalative	0.001	mg/m³	
Long-term exposure, systemic, dermal	0.07	mg/kg bw/d	

NA = Not applicable

1.13.2.3. Indirect exposure of humans via the environment (oral)

The bioaccumulation potential of this substance is very low, with a Kow of 0.0339; therefore, indirect exposure of humans via the environment can be considered negligible.

1.13.2.4. Environmental exposure

The environmental exposure scenario is evaluated below. Exposure has been estimated using the version of the ECETOC TRA Integrated Tool current at the time of preparation of this document.

Table 93: Environmental Exposure Scenario ES13-E1

Section 1	Operational conditions and risk management measures			
Section 1.2	Control of environmental exposure			
Identifier*	ES13-E1			
Contributing scenario	Use in Biocidal Products			
Environmental Release Category	ERC8d			
Specific ERC				
Assessment scenario				
Operational Conditions				
Amounts used				
Amounts used in the EU (tonnes/year)	200,000 (total industry tonnage for use in production of polymers)			
Fraction of EU tonnage used in region	0.1			

Fraction of main source to local environment	0.002
Fraction of substance in end-use products	1
Maximum daily site tonnage (kg/day)	1,096
Frequency and duration of use	1,070
Type of release	Continuous
Emission days (days/year)	365 - ERC8d
Site specific monitoring data results for	303 - ERCou
surface water effluent	
Location of sample	
Environmental factors not influenced by	
risk management	
Local freshwater dilution factor	10 (default)
Local marine water dilution factor	100 (default)
Other given operational conditions	100 (deldar)
affecting environmental exposure	
Risk Management Measures	
Technical conditions and measures at	
process level (source) to prevent release	
Technical onsite conditions and	
measures to reduce or limit discharges,	
air emissions and releases to soil	
Treat air emissions to provide a typical	
removal efficiency of (%)	
Treat wastewater (prior to discharge to	87%
receiving water) to provide the required	
removal efficiency of (%) ETotal,RMM =	
$1 - ((1 - ERMM, 1) \times (1 - ERMM, 2))$	
Organizational measures to	
prevent/limit release from site	
Conditions and measures related to	
municipal sewage treatment plant	
Conditions and measures related to external treatment of waste for disposal	
Conditions and measures related to	
external recovery of waste	
Other environmental control measures	
additional to above	721 71
Identifier	ES13-E1
Narrative	Release fraction derived from ERC (8d)
Release fraction to air from process	1.00E+00
Release fraction to wastewater from process	1.00E+00
Release fraction to soil from process	2.00E-01

(regional only)	
Local release to air (kg/d)	1.10E+02
Local release to sewage (kg/d)	1.10E+02
Local release to soil (kg/d)	2.19E+01
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	
Total efficiency of removal from air emissions (%)	
The maximum allowable site tonnage (M_{Safe}) based on removal from domestic sewage treatment (kg/d)	7,299

1.13.2.4.1 Predicted exposure concentrations in the STP and in the aquatic compartments (freshwater, seawater and sediments)

Table 94: Predicted exposure concentrations in the STP and in the aquatic compartments (freshwater, seawater and sediments)

Local Concentration, Compartment: STP		
and aquatic	unit	ES13-E1
Local PEC in surface water during emission	mg/L	8.301E-01
episode (dissolved)		
Annual average local PEC in surface water	mg/L	8.301E-01
(dissolved)		
Local PEC in fresh water sediment during	mg/kg	3.138E+00
emission episode	dwt	
Local PEC in sea water during emission	mg/L	8.284E-02
episode		
Annual average local PEC in sea water	mg/L	8.284E-02
(dissolved)		
Local PEC in marine sediment during	mg/kg	3.131E-01
emission episode	dwt	
PEC for microorganisms in STP	mg/L	6.935E+00
Comments		_

1.13.2.4.2 Predicted exposure concentration in soils

Table 95: Predicted exposure concentration in soils

Local Concentration, Compartment: soil	unit	ES13-E1
Local PEC in agricultural soil, averaged over	mg/kg	1.879E-01
30 days	dwt	
Local PEC agricultural soil, averaged over	mg/kg	1.695E-01
180 days	dwt	
Local PEC in grass land, averaged over 180	mg.kg	1.650E-01
days	dwt	
Comments		

1.13.2.4.3 Predicted exposure concentration in the atmospheric compartment

Table 96: Predicted exposure concentration in the atmospheric compartment

Local	Concentration,		
Compartment:	air	unit	ES13-E1
Annual average (total)	e local PEC in air	kg/m ³	1.083E-10
Comments			

1.13.2.4.4 Predicted exposure concentration in food for secondary poisoning

The bioaccumulation potential of this substance is very low, therefore secondary poisoning can be considered negligible. The Kow for DEG is 0.0339.

1.14 Use in Lubricants (industrial)

1.14.1 Exposure Scenario 14

General Remarks

The relevant OCs used for calculation of environmental exposure are mentioned under paragraph 1.14.2.4.

Table 97: Description of ES 14

Table 97: Description of ES 14				
Reference Number	14			
1.14.1.1 Title				
Free short title	Use in lubricants (industrial)			
Systematic title based on use descriptor	SU3; PROC 1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 13, 17 and 18; ERC 4			
1.14.1.2. Operational conditions and risk management measures				
1.14.1.2.1 Control of workers exposure for PROC 1				
Workers related free short title	Use in closed process, no likelihood of exposure			
Use descriptor covered	PROC 1			
Processes, tasks, activities covere	Use of the substance in high integrity contained system where little potential exists for exposures, e.g. any sampling via closed loop systems			
Assessment Mathed	ECETOC TRA Worker v2.0 with modifications			
Assessment Method	(see 1. General remarks)			
For further details on OCs and RMMs see Table 14				
1.14.1.2.2 Control of workers exp	osure for PROC 2			
Workers related free short title Use in closed, continuous process with occas controlled exposure				
Use descriptor covered	PROC 2			
Processes, tasks, activities covere	Continuous process but where the design philosophy is not specifically aimed at minimizing emissions. Occasional exposure will arise e.g. through maintenance, sampling and equipment breakages			
Assassment Mathed	ECETOC TRA Worker v2.0 with modifications			
Assessment Method	(see 1. General remarks)			
For further details on OCs and RMMs see Table 14				
1.14.1.2.3 Control of workers exposure for PROC 3 and 4				
Workers related free short title	Use in closed batch process (synthesis or formulation). Use in batch and other process (synthesis) where			

	opportunity for exposure arises.			
Use descriptor covered	PROC 3 and 4			
Processes, tasks, activities covered	Batch manufacture of a chemical or formulation where the predominant handling is in a contained manner, e.g. through enclosed transfers, but where some opportunity for contact with chemicals occurs, e.g. through sampling			
	Use in batch manufacture of a chemical where significant opportunity for exposure arises, e.g. during charging, sampling or discharge of material, and when the nature of the design is likely to result in exposure.			
Assessment Method	ECETOC TRA Worker v2.0 with modifications			
Assessment Method	(see 1. General remarks)			
For further details on OCs and RMM	s see Table 2			
1.14.1.2.4 Control of workers exposure for PROC 5				
Workers related free short title	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact).			
Use descriptor covered	PROC 5			
Processes, tasks, activities covered	Manufacture or formulation of chemical products or articles using technologies related to mixing and blending of solid or liquid materials, and where the process is in stages and provides the opportunity for significant contact at any stage			
Assessment Method	ECETOC TRA Worker v2.0 with modifications			
	(see 1. General remarks)			
For further details on OCs and RMM	s see Table 14			
1.14.1.2.5 Control of workers exposur	e for PROC 7			
Workers related free short title	Industrial spraying			
Use descriptor covered	PROC 7			
	Air dispersive techniques			
	Spraying for surface coating, adhesives, polishes/cleaners, air care products, sandblasting			
Processes, tasks, activities covered	Substances can be inhaled as aerosols. The energy of the aerosol particles may require advanced exposure controls; in case of coating, overspray may lead to waste water and waste.			
Assessment Method	Stoffenmanager v4.0			
	Stoffenmanager v4.0			
For further details on OCs and RMM				
	Is see Table 46			

	(charging/discharging) from/to vessels/large			
	containers at non-dedicated facilities.			
Use descriptor covered	PROC 8a			
Processes, tasks, activities covered	Sampling, loading, filling, transfer, dumping, bagging in non- dedicated facilities. Exposure related to dust, vapour, aerosols or spillage, and cleaning of equipment to be expected.			
Assessment Method	ECETOC TRA Worker v2.0 with modifications			
Assessment Method	(see 1. General remarks)			
For further details on OCs and RMMs see Table 2				
1.14.1.2.7 Control of workers exposure for PROC 8b				
Workers related free short title	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities.			
Use descriptor covered	PROC 8b			
Processes, tasks, activities covered	Sampling, loading, filling, transfer, dumping, bagging in dedicated facilities. Exposure related to dust, vapour, aerosols or spillage, and cleaning of equipment to be expected.			
Aggaggment Mathad	ECETOC TRA Worker v2.0 with modifications			
Assessment Method	(see 1. General remarks)			
For further details on OCs and RMM	Is see Table 2			
1.14.1.2.8 Control of workers exposur	re for PROC 9			
Workers related free short title	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)			
Use descriptor covered	PROC 9			
Processes, tasks, activities covered	Filling lines specifically designed to both capture vapour and aerosol emissions and minimise spillage			
	vapour and aerosol emissions and minimise			
Processes, tasks, activities covered Assessment Method	vapour and aerosol emissions and minimise spillage			
	vapour and aerosol emissions and minimise spillage ECETOC TRA Worker v2.0 with modifications (see 1. General remarks)			
Assessment Method	vapour and aerosol emissions and minimise spillage ECETOC TRA Worker v2.0 with modifications (see 1. General remarks) Is see Table 14			
Assessment Method For further details on OCs and RMM	vapour and aerosol emissions and minimise spillage ECETOC TRA Worker v2.0 with modifications (see 1. General remarks) Is see Table 14			
Assessment Method For further details on OCs and RMM 1.14.1.2.9 Control of workers exposure	vapour and aerosol emissions and minimise spillage ECETOC TRA Worker v2.0 with modifications (see 1. General remarks) Is see Table 14 re for PROC 10			
Assessment Method For further details on OCs and RMM 1.14.1.2.9 Control of workers exposure Workers related free short title	vapour and aerosol emissions and minimise spillage ECETOC TRA Worker v2.0 with modifications (see 1. General remarks) Is see Table 14 re for PROC 10 Roller application or brushing			
Assessment Method For further details on OCs and RMM 1.14.1.2.9 Control of workers exposure Workers related free short title	vapour and aerosol emissions and minimise spillage ECETOC TRA Worker v2.0 with modifications (see 1. General remarks) Is see Table 14 re for PROC 10 Roller application or brushing PROC 10			

	(see 1. General remarks)			
For further details on OCs and RMMs see Table 46				
1.14.1.2.10 Control of workers exposu	ire for PROC 13			
Workers related free short title	Treatment of articles by dipping and pouring.			
Use descriptor covered	PROC 13			
Processes, tasks, activities covered	Immersion operations. Treatment of articles by dipping, pouring, immersing, soaking, washing out or washing in substances; including cold formation or resin type matrix. Includes handling of treated objects (e.g. after dying, plating). Substance is applied to a surface by low energy techniques such as dipping the article into a bath or pouring a preparation onto a surface.			
Assessment Method	ECETOC TRA Worker	v2.0 with modifications		
Assessment Method	(see 1. General remarks)			
For further details on OCs and RMMs see Table 23				
1.14.1.2.11 Control of workers exposure for PROC 17 and 18				
Workers related free short title	Lubrication at high energy conditions and in partly open process.			
Use descriptor covered	Greasing at high energy conditions. PROC 17 and 18			
Processes, tasks, activities covered	Lubrication at high energy conditions (temperature, friction) between moving parts and substance; significant part of process is open to workers. The metal working fluid may form aerosols or fumes due to rapidly moving metal parts. Use as lubricant where significant energy or temperature is applied between the substance and			
Assessment Method	the moving parts. ECETOC TRA Worker v2.0 with modifications			
ASSESSMENT METHOU	(see 1. General remarks)			
Product characteristic				
Physical state	Liquid			
Fugacity	Low			
Concentration of substance	100	%		
Vapour pressure of the substance	0.008 hPa			
Amounts used				
Not relevant				
Frequency and duration of use/expos	ure			
Duration of exposure	> 4 hours/day			

Frequency of exposure		≤ 240 days/year			
Human factors not influenced by risk management					
Exposed skin surface		Both hands (960 cm ²)			
Other given operational conditions affecting workers exposure					
Location		Indoor			
Domain		Industrial			
Technical conditions and me	asures a	t process level (s	ource) to pr	event release	e
None					
Technical conditions and measures to control dispersion from source towards the worker					
Local exhaust ventilation requ	exhaust ventilation required Yes Effectiveness: 90%				
In case no Local exhaust ventilation is present a suitable respiratory protection of adequate effectiveness is required.					f adequate
Organisational measures to prevent /limit releases, dispersion and exposure					
Not relevant in ECETOC TRA					
Conditions and measures related to personal protection, hygiene and health evaluation					
Respiratory protection required	No				
Use of suitable gloves with basic training	Yes	Effectiven	ess: 90%	Relevant f	or PROC

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

Use of tightly fitting safety goggles

(The substance has shown to cause mucosal irritations at relatively high concentrations. Thus, it is recommended to protect the eyes)

1.14.2 Exposure Estimation

1.14.2.1. Workers exposure

For the estimated exposure for workers / PROC 1 see Table 15 For the estimated exposure for workers / PROC 2 see Table 16

For the estimated exposure for workers / PROC 2 see Table 10

For the estimated exposure for workers / PROC 3 see Table 5

For the estimated exposure for workers / PROC 4 see Table 6

For the estimated exposure for workers / PROC 7 see Table 47

For the estimated exposure for workers / PROC 8a see Table 7

For the estimated exposure for workers / PROC 8b see Table 8

For the estimated exposure for workers / PROC 9 see Table 18

For the estimated exposure for workers / PROC 10 see Table 48 For the estimated exposure for workers / PROC 13 see Table 24

Table 98: Estimated exposure for workers – PROC 17

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Route of exposure	Concentrations		Justification
	Value	Unit	
Long-term exposure, systemic/local, inhalative	4.42	mg/m³	NA
Long-term exposure, systemic, dermal	2.74	mg/kg bw/d	NA

NA = Not applicable

Table 99: Estimated exposure for workers – PROC 18

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Route of exposure	Concentrations		Justification
	Value	Unit	
Long-term exposure, systemic/local, inhalative	4.42	mg/m³	NA
Long-term exposure, systemic, dermal	13.71	mg/kg bw/d	NA

NA = Not applicable

1.14.2.2. Consumer exposure

Not applicable

1.14.2.3. Indirect exposure of humans via the environment (oral)

The bioaccumulation potential of this substance is very low, with a Kow of 0.0339; therefore, indirect exposure of humans via the environment can be considered negligible.

1.14.2.4. Environmental exposure

Table 100: Environmental Exposure Scenario ES14-E1

Section 1	Operational conditions and risk management measures
Section 1.2	Control of environmental exposure
Identifier*	ES14-E1
Contributing scenario	Use In Lubricants
Environmental Release Category	ERC4
Specific ERC	ESVOC 13
Assessment scenario	
Operational Conditions	
Amounts used	
Amounts used in the EU (tonnes/year)	200,000 (total industry tonnage for use in production of polymers)
Fraction of EU tonnage used in region	1
Fraction of main source to local environment	0.0005
Fraction of substance in end-use products	1
Maximum daily site tonnage (kg/day)	5,000
Frequency and duration of use	
Type of release	Continuous
Emission days (days/year)	20 - ESVOC 13
Site specific monitoring data results for surface water effluent	
Location of sample	
Environmental factors not influenced by risk management	
Local freshwater dilution factor	10 (default)
Local marine water dilution factor	100 (default)
Other given operational conditions affecting environmental exposure	
Risk Management Measures	
Technical conditions and measures at	
process level (source) to prevent release	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Treat air emissions to provide a typical removal efficiency of (%)	
Treat wastewater (prior to discharge to receiving water) to provide the required removal efficiency of (%) ETotal,RMM = $1 - ((1 - ERMM, 1) \times (1 - ERMM, 2))$	87%

Organizational measures to prevent/limit release from site	
Conditions and measures related to municipal sewage treatment plant	
Conditions and measures related to external treatment of waste for disposal	
Conditions and measures related to external recovery of waste	
Other environmental control measures additional to above	
Identifier	ES14-E1
Narrative	Release fraction derived from SpERC (ESVOC 13)
Release fraction to air from process	3.00E-05
Release fraction to wastewater from process	1.00E-03
Release fraction to soil from process (regional only)	1.00E-03
Local release to air (kg/d)	1.50E-01
Local release to sewage (kg/d)	5.00E+00
Local release to soil (kg/d)	5.00E+00
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	
Total efficiency of removal from air emissions (%)	
The maximum allowable site tonnage (M_{Safe}) based on removal from domestic sewage treatment (kg/d)	842,524
Scaling	

The downstream user can check the compliance of his site by comparing site specific data with defaults used in the exposure assessment. The site specific quotient should be inferior or equal to the spERC quotient.

$$\frac{m_{\text{spERC}}^{*}(1-E_{\text{ER,spERC}})*F_{\text{releasespERC}}}{DF_{\text{spERC}}} \ge \frac{m_{\text{site}}*(1-E_{\text{ER,site}})*F_{\text{releasesite}}}{DF_{\text{site}}}$$

 m_{spERC} : Substance use rate in spERC $E_{ER,spERC}$: Efficacy of RMM in spERC $F_{release,..spERC}$: Initial release fraction in

spERC

 \hat{DF}_{spERC} : dilution factor of STP effluent in

river

 m_{site} : Substance use rate at site $E_{ER,site}$: Efficacy of RMM at site

 $F_{release,,site}$: Initial release fraction at site DF_{site} : dilution factor of STP effluent in

river

1.14.2.4.1 Predicted exposure concentrations in the STP and in the aquatic compartments (freshwater, seawater and sediments)

Table 101: Predicted exposure concentrations in the STP and in the aquatic compartments

Local Concentration, Compartment: STP		
and aquatic	unit	ES14-E1
Local PEC in surface water during emission	mg/L	3.281E-02
episode (dissolved)		
Annual average local PEC in surface water	mg/L	2.905E-03
(dissolved)		
Local PEC in fresh water sediment during	mg/kg	1.240E-01
emission episode	dwt	
Local PEC in sea water during emission	mg/L	3.275E-03
episode		
Annual average local PEC in sea water	mg/L	2.845E-04
(dissolved)		
Local PEC in marine sediment during	mg/kg	1.238E-02
emission episode	dwt	
PEC for microorganisms in STP	mg/L	3.164E-01
Comments		

1.14.2.4.2 Predicted exposure concentration in soils

Table 102: Predicted exposure concentration in soils

Local Concentration, Compartment: soil	unit	ES14-E1
Local PEC in agricultural soil, averaged over 30 days	mg/kg dwt	1.203E-03
Local PEC agricultural soil, averaged over 180 days	mg/kg dwt	3.638E-04
Local PEC in grass land, averaged over 180 days	mg.kg dwt	1.549E-04
Comments		

1.14.2.4.3 Predicted exposure concentration in the atmospheric compartment

Table 103: Predicted exposure concentration in the atmospheric compartment

Local	Concentration,		
Compartment:	air	unit	ES14-E1
Annual average (total)	local PEC in air	kg/m ³	2.325E-12
Comments			

1.14.2.4.4 Predicted exposure concentration in food for secondary poisoning

The bioaccumulation potential of this substance is very low, therefore secondary poisoning can be considered negligible. The Kow for DEG is 0.0339.

1.15 Use in Metal-working fluids (industrial)

1.15.1 Exposure Scenario 15

General Remarks

The relevant OCs used for calculation of environmental exposure are mentioned under paragraph 1.15.2.4.

Table 104: Description of ES 15

List. 1.2. Operational conditions and risk management measures	Table 104: Description of ES 15		
Systematic title based on use descriptor SU3; PROC 1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 13, and descriptor ERC 4	deference Number	15	
Systematic title based on use descriptor I.15.1.2. Operational conditions and risk management measures I.15.1.2.1 Control of workers exposure for PROC 1 Workers related free short title Use in closed process, no likelihood of exposure system where little potential exists for exposure. g. any sampling via closed loop systems Assessment Method For further details on OCs and RMMs see Table 14 I.15.1.2.2 Control of workers exposure for PROC 2 Workers related free short title Use in closed, continuous process with occas controlled exposure Use in closed, continuous process with occas controlled exposure Use descriptor covered PROC 2 Continuous process but where the dephilosophy is not specifically aimed at minime emissions. Occasional exposure will arise through maintenance, sampling and equip breakages	.15.1.1 Title		
List. 1.2. Operational conditions and risk management measures	ree short title	Use in metal-working fluids (industrial)	
1.15.1.2.1 Control of workers exposure for PROC 1 Workers related free short title Use descriptor covered PROC 1 Use of the substance in high integrity contagonates system where little potential exists for exposence, any sampling via closed loop systems ECETOC TRA Worker v2.0 with modification (see 1. General remarks) For further details on OCs and RMMs see Table 14 1.15.1.2.2 Control of workers exposure for PROC 2 Workers related free short title Use descriptor covered PROC 2 Continuous process but where the dephilosophy is not specifically aimed at minim emissions. Occasional exposure will arise through maintenance, sampling and equip breakages	•	SU3; PROC 1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 13, and 17; ERC 4	
Workers related free short title Use descriptor covered PROC 1 Use of the substance in high integrity conta system where little potential exists for expose e.g. any sampling via closed loop systems ECETOC TRA Worker v2.0 with modification (see 1. General remarks) For further details on OCs and RMMs see Table 14 1.15.1.2.2 Control of workers exposure for PROC 2 Workers related free short title Use descriptor covered PROC 2 Continuous process with occase controlled exposure Processes, tasks, activities covered PROC 2 Continuous process but where the dephilosophy is not specifically aimed at minime emissions. Occasional exposure will arise through maintenance, sampling and equip breakages	.15.1.2. Operational conditions a	nd risk management measures	
Workers related free short title Use descriptor covered Processes, tasks, activities covered Assessment Method For further details on OCs and RMMs see Table 14 1.15.1.2.2 Control of workers exposure for PROC 2 Workers related free short title Use descriptor covered PROC 2 Continuous process but where the dephilosophy is not specifically aimed at minim emissions. Occasional exposure will arise through maintenance, sampling and equip breakages	.15.1.2.1 Control of workers exp	osure for PROC 1	
Processes, tasks, activities covered Use of the substance in high integrity contast system where little potential exists for expose e.g. any sampling via closed loop systems ECETOC TRA Worker v2.0 with modification (see 1. General remarks) For further details on OCs and RMMs see Table 14 1.15.1.2.2 Control of workers exposure for PROC 2 Workers related free short title Use in closed, continuous process with occase controlled exposure PROC 2 Continuous process but where the dephilosophy is not specifically aimed at minime emissions. Occasional exposure will arise through maintenance, sampling and equip breakages	Vorkers related free short title	Use in closed process, no likelihood of exposure	
System where little potential exists for expose e.g. any sampling via closed loop systems	se descriptor covered	PROC 1	
See 1. General remarks	Processes, tasks, activities covered Use of the substance in high integrity of system where little potential exists for expectations.		
(see 1. General remarks) For further details on OCs and RMMs see Table 14 1.15.1.2.2 Control of workers exposure for PROC 2 Workers related free short title	assassment Method	ECETOC TRA Worker v2.0 with modifications	
1.15.1.2.2 Control of workers exposure for PROC 2 Workers related free short title Use in closed, continuous process with occas controlled exposure PROC 2 Continuous process but where the dephilosophy is not specifically aimed at minime emissions. Occasional exposure will arise through maintenance, sampling and equip breakages	issessment ivietnou	(see 1. General remarks)	
Workers related free short title Use in closed, continuous process with occas controlled exposure PROC 2 Continuous process but where the dephilosophy is not specifically aimed at minime emissions. Occasional exposure will arise through maintenance, sampling and equip breakages	For further details on OCs and RMMs see Table 14		
Use descriptor covered PROC 2 Continuous process but where the dephilosophy is not specifically aimed at minime emissions. Occasional exposure will arise through maintenance, sampling and equip breakages	1.15.1.2.2 Control of workers exposure for PROC 2		
Processes, tasks, activities covered Continuous process but where the dephilosophy is not specifically aimed at minime emissions. Occasional exposure will arise through maintenance, sampling and equip breakages	Workers related free short title Use in closed, continuous process with occasional controlled exposure		
Processes, tasks, activities covered philosophy is not specifically aimed at minim emissions. Occasional exposure will arise through maintenance, sampling and equip breakages	Use descriptor covered PROC 2		
ECETOC TD A Worker vo 0 with medicaction	rocesses, tasks, activities covered	philosophy is not specifically aimed at minimizing emissions. Occasional exposure will arise e.g. through maintenance, sampling and equipment	
Assessment Method	Assessment Method	ECETOC TRA Worker v2.0 with modifications	
(see 1. General remarks)	/		
For further details on OCs and RMMs see Table 14			
1.15.1.2.3 Control of workers exposure for PROC 3 and 4			
Workers related free short title formulation).	Vorkers related free short title	1 \ \ \ \ \	

	opportunity for exposure arises.	
Use descriptor covered	PROC 3 and 4	
Processes, tasks, activities covered	Batch manufacture of a chemical or formulation where the predominant handling is in a contained manner, e.g. through enclosed transfers, but where some opportunity for contact with chemicals occurs, e.g. through sampling	
	Use in batch manufacture of a chemical where significant opportunity for exposure arises, e.g. during charging, sampling or discharge of material, and when the nature of the design is likely to result in exposure.	
Assessment Method	ECETOC TRA Worker v2.0 with modifications	
Assessment Method	(see 1. General remarks)	
For further details on OCs and RMM	Is see Table 2	
1.15.1.2.4 Control of workers exposur	re for PROC 5	
Workers related free short title	Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact).	
Use descriptor covered	PROC 5	
Processes, tasks, activities covered	Manufacture or formulation of chemical products or articles using technologies related to mixing and blending of solid or liquid materials, and where the process is in stages and provides the opportunity for significant contact at any stage	
	ECETOC TRA Worker v2.0 with modifications	
Assessment Method	(see 1. General remarks)	
For further details on OCs and RMMs see Table 14		
1.15.1.2.5 Control of workers exposure for PROC 7		
Workers related free short title	Industrial spraying	
Use descriptor covered	PROC 7	
Processes, tasks, activities covered	Air dispersive techniques	
	Spraying for surface coating, adhesives, polishes/cleaners, air care products, sandblasting	
	Substances can be inhaled as aerosols. The energy of the aerosol particles may require advanced exposure controls; in case of coating, overspray may lead to waste water and waste.	
Assessment Method	Staffanmanagar v. 10	
For further details on OCs and RMMs see Table 46		
For further details on OCs and RMM	Stoffenmanager v4.0 Is see Table 46	
For further details on OCs and RMM 1.15.1.2.6 Control of workers exposure	Is see Table 46	

	(charging/discharging) from/to vessels/large	
	containers at non-dedicated facilities.	
Use descriptor covered	PROC 8a	
Processes, tasks, activities covered	Sampling, loading, filling, transfer, dumping, bagging in non- dedicated facilities. Exposure related to dust, vapour, aerosols or spillage, and cleaning of equipment to be expected.	
Assessment Method	ECETOC TRA Worker v2.0 with modifications	
rissessment freehou	(see 1. General remarks)	
For further details on OCs and RMM	Is see Table 2	
1.15.1.2.7 Control of workers exposur	re for PROC 8b	
Workers related free short title	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities.	
Use descriptor covered	PROC 8b	
Processes, tasks, activities covered	Sampling, loading, filling, transfer, dumping, bagging in dedicated facilities. Exposure related to dust, vapour, aerosols or spillage, and cleaning of equipment to be expected.	
A (200 A)	ECETOC TRA Worker v2.0 with modifications	
Assessment Method	(see 1. General remarks)	
For further details on OCs and RMMs see Table 2		
1.15.1.2.8 Control of workers exposur	re for PROC 9	
1.15.1.2.8 Control of workers exposure Workers related free short title	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	
	Transfer of substance or preparation into small containers (dedicated filling line, including	
Workers related free short title	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	
Workers related free short title Use descriptor covered Processes, tasks, activities covered	Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC 9 Filling lines specifically designed to both capture vapour and aerosol emissions and minimise	
Workers related free short title Use descriptor covered	Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC 9 Filling lines specifically designed to both capture vapour and aerosol emissions and minimise spillage	
Workers related free short title Use descriptor covered Processes, tasks, activities covered	Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC 9 Filling lines specifically designed to both capture vapour and aerosol emissions and minimise spillage ECETOC TRA Worker v2.0 with modifications (see 1. General remarks)	
Workers related free short title Use descriptor covered Processes, tasks, activities covered Assessment Method	Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC 9 Filling lines specifically designed to both capture vapour and aerosol emissions and minimise spillage ECETOC TRA Worker v2.0 with modifications (see 1. General remarks) Is see Table 14	
Workers related free short title Use descriptor covered Processes, tasks, activities covered Assessment Method For further details on OCs and RMM	Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC 9 Filling lines specifically designed to both capture vapour and aerosol emissions and minimise spillage ECETOC TRA Worker v2.0 with modifications (see 1. General remarks) Is see Table 14	
Workers related free short title Use descriptor covered Processes, tasks, activities covered Assessment Method For further details on OCs and RMM 1.15.1.2.9 Control of workers exposure	Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC 9 Filling lines specifically designed to both capture vapour and aerosol emissions and minimise spillage ECETOC TRA Worker v2.0 with modifications (see 1. General remarks) Is see Table 14 re for PROC 10	
Workers related free short title Use descriptor covered Processes, tasks, activities covered Assessment Method For further details on OCs and RMM 1.15.1.2.9 Control of workers exposured Workers related free short title	Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC 9 Filling lines specifically designed to both capture vapour and aerosol emissions and minimise spillage ECETOC TRA Worker v2.0 with modifications (see 1. General remarks) Is see Table 14 re for PROC 10 Roller application or brushing	
Workers related free short title Use descriptor covered Processes, tasks, activities covered Assessment Method For further details on OCs and RMM 1.15.1.2.9 Control of workers exposured Workers related free short title	Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC 9 Filling lines specifically designed to both capture vapour and aerosol emissions and minimise spillage ECETOC TRA Worker v2.0 with modifications (see 1. General remarks) Is see Table 14 re for PROC 10 Roller application or brushing PROC 10	

	(see 1. General remarks)	
For further details on OCs and RMMs see Table 46		
1.15.1.2.10 Control of workers exposu	re for PROC 13	
Workers related free short title	Treatment of articles by dipping and pouring.	
Use descriptor covered	PROC 13	
Processes, tasks, activities covered	Immersion operations. Treatment of articles by dipping, pouring, immersing, soaking, washing out or washing in substances; including cold formation or resin type matrix. Includes handling of treated objects (e.g. after dying, plating). Substance is applied to a surface by low energy techniques such as dipping the article into a bath or pouring a preparation onto a surface.	
Assessment Method	ECETOC TRA Worker v2.0 with modifications (see 1. General remarks)	
For further details on OCs and RMMs see Table 23		
1.15.1.2.11 Control of workers exposure for PROC 17		
Workers related free short title	Lubrication at high energy conditions and in partly open process.	
Use descriptor covered	PROC 17	
Processes, tasks, activities covered	Lubrication at high energy conditions (temperature, friction) between moving parts and substance; significant part of process is open to workers. The metal working fluid may form aerosols or fumes due to rapidly moving metal parts.	
Assessment Method	ECETOC TRA Worker v2.0 with modifications (see 1. General remarks)	
For further details on OCs and RMMs see Table 45		

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

Use of tightly fitting safety goggles

(The substance has shown to cause mucosal irritations at relatively high concentrations. Thus, it is recommended to protect the eyes)

1.15.2 Exposure Estimation

1.15.2.1. Workers exposure

For the estimated exposure for workers / PROC 1 see Table 15
For the estimated exposure for workers / PROC 2 see Table 16
For the estimated exposure for workers / PROC 3 see Table 5
For the estimated exposure for workers / PROC 4 see Table 6
For the estimated exposure for workers / PROC 7 see Table 47
For the estimated exposure for workers / PROC 8a see Table 7
For the estimated exposure for workers / PROC 8b see Table 8
For the estimated exposure for workers / PROC 9 see Table 18
For the estimated exposure for workers / PROC 10 see Table 48
For the estimated exposure for workers / PROC 13 see Table 24
For the estimated exposure for workers / PROC 17 see Table 98

1.15.2.2. Consumer exposure

Not applicable

1.15.2.3. Indirect exposure of humans via the environment (oral)

The bioaccumulation potential of this substance is very low, with a Kow of 0.0339; therefore, indirect exposure of humans via the environment can be considered negligible.

1.15.2.4. Environmental exposure

Table 105: Environmental Exposure Scenario ES15-E1

Section 1	Operational conditions and risk management measures
Section 1.2	Control of environmental exposure
Identifier*	ES15-E1
Contributing scenario	Use In Metal Working Fluids
Environmental Release Category	ERC4
Specific ERC	ESVOC 18
Assessment scenario	
Operational Conditions	
Amounts used	
Amounts used in the EU (tonnes/year)	200,000 (total industry tonnage for use in production of polymers)
Fraction of EU tonnage used in region	1
Fraction of main source to local environment	0.0005
Fraction of substance in end-use products	1
Maximum daily site tonnage (kg/day)	5,000
Frequency and duration of use	
Type of release	Continuous

Emission days (days/year)	20 - ESVOC 18
Site specific monitoring data results for	
surface water effluent	
Location of sample	
Environmental factors not influenced by	
risk management	
Local freshwater dilution factor	10 (default)
Local marine water dilution factor	100 (default)
Other given operational conditions	
affecting environmental exposure	
Risk Management Measures	
Technical conditions and measures at	
process level (source) to prevent release	
Technical onsite conditions and	
measures to reduce or limit discharges,	
air emissions and releases to soil	
Treat air emissions to provide a typical	
removal efficiency of (%)	
Treat wastewater (prior to discharge to	87%
receiving water) to provide the required	
removal efficiency of (%) ETotal,RMM =	
1 – ((1 – ERMM, 1) x (1 – ERMM,2))	
Organizational measures to prevent/limit release from site	
Conditions and measures related to	
municipal sewage treatment plant	
Conditions and measures related to	
external treatment of waste for disposal	
Conditions and measures related to	
external recovery of waste	
Other environmental control measures	
additional to above	
Identifier	ES15-E1
Narrative Narrative	Release fraction derived from SpERC (ESVOC
1 variative	18)
Release fraction to air from process	6.00E-03
Release fraction to wastewater from	1.00E-03
process	
Release fraction to soil from process	0.00E+00
(regional only)	
Local release to air (kg/d)	3.00E+01
Local release to sewage (kg/d)	
	5.00E+00
	5.00E+00 0.00E+00
Local release to soil (kg/d) Total efficiency of removal from	

wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	
Total efficiency of removal from air emissions (%)	
The maximum allowable site tonnage (M_{Safe}) based on removal from domestic sewage treatment (kg/d)	696,441
Scaling	

The downstream user can check the compliance of his site by comparing site specific data with defaults used in the exposure assessment. The site specific quotient should be inferior or equal to the spERC quotient.

$$\frac{m_{\text{spERC}}^{*}(1-E_{\text{ER,spERC}})*F_{\text{releasespERC}}}{DF_{\text{spERC}}} \ge \frac{m_{\text{site}}^{*}(1-E_{\text{ER,site}})*F_{\text{releasesite}}}{DF_{\text{site}}}$$

 m_{spERC} : Substance use rate in spERC $E_{ER,spERC}$: Efficacy of RMM in spERC $F_{release,.spERC}$: Initial release fraction in

spERC

DF_{spERC}: dilution factor of STP effluent in

river

 m_{site} : Substance use rate at site $E_{ER,site}$: Efficacy of RMM at site

 $F_{release,,site}$: Initial release fraction at site DF_{site} : dilution factor of STP effluent in

river

1.15.2.4.1 Predicted exposure concentrations in the STP and in the aquatic compartments (freshwater, seawater and sediments)

Table 106 Predicted exposure concentrations in the STP and in the aquatic compartments (freshwater, seaweter and sediments)

Local Concentration, Compartment: STP		
and aquatic	unit	ES15-E1
Local PEC in surface water during emission	mg/L	3.586E-02
episode (dissolved)		
Annual average local PEC in surface water	mg/L	5.957E-03
(dissolved)		
Local PEC in fresh water sediment during	mg/kg	1.356E-01
emission episode	dwt	
Local PEC in sea water during emission	mg/L	3.595E-03
episode		
Annual average local PEC in sea water	mg/L	6.041E-04
(dissolved)		
Local PEC in marine sediment during	mg/kg	1.359E-02
emission episode	dwt	
PEC for microorganisms in STP	mg/L	3.164E-01
Comments		

1.15.2.4.2 Predicted exposure concentration in soils

Table 107: Predicted exposure concen tration in soils

Local Concentration, Compartment: soil	unit	ES15-E1
Local PEC in agricultural soil, averaged over 30 days	mg/kg dwt	1.098E-02
Local PEC agricultural soil, averaged over 180 days	mg/kg dwt	1.015E-02
Local PEC in grass land, averaged over 180 days	mg.kg dwt	9.982E-03
Comments		

1.15.2.4.3 Predicted exposure concentration in the atmospheric compartment

Table 108: Predicted exposure concen tration in the atmospheric compartment

Local Concentrati	tion,	
Compartment: air	unit	ES15-E1
Annual average local PEC in (total)	n air kg/m³	4.635E-10
Comments		

1.15.2.4.4 Predicted exposure concentration in food for secondary poisoning

The bioaccumulation potential of this substance is very low, therefore secondary poisoning can be considered negligible. The Kow for DEG is 0.0339.

1.16 Use in Metal-working fluids (professional)

1.16.1 Exposure Scenario 16

General Remarks

The relevant OCs used for calculation of environmental exposure are mentioned under paragraph 1.16.2.4.

Table 109: Description of ES 16

Table 109: Description of ES 10		
Reference Number	16	
1.16.1.1 Title		
Free short title	Use in metal-working fluids (professional)	
Systematic title based on use descriptor	SU22; PROC 1, 2, 3, 5, 8a, 8b, 9, 10, 11, 13, and 17; ERC 8a	
1.16.1.2 Operational conditions	and Risk management measures	
1.16.1.2.1Control of workers exp	osure for PROC 1, 2, 3	
	Use in closed process, no likelihood of exposure.	
Workers related free short title	Use in closed, continuous process with occasional controlled exposure.	
	Use in closed batch process (synthesis or formulation).	
Use descriptor covered	PROC 1, 2, 3	
Processes, tasks, activities covere	Use of the substances in high integrity contained system where little potential exists for exposures, e.g. any sampling via closed loop systems. Continuous process but where the design philosophy is not specifically aimed at minimizing emissions. It is not high integrity and occasional expose will arise e.g. through maintenance, sampling and equipment breakages. Batch manufacture of a chemical or formulation where the predominant handling is in a contained manner, e.g. through enclosed transfers, but where some opportunity for contact with chemicals occurs, e.g. through sampling.	
Assessment Method	ECETOC TRA workers (v2.0) modified (see 1. Genral remarks)	
For further details on OCs and l	RMMs see Table 53	
1.16.1.2.2 Control of workers exposure for PROC 5		
Workers related free short title	Use in batch and other process (synthesis) where opportunity for exposure arises.	
Use descriptor covered	PROC 5	

Processes, tasks, activities covered	Manufacture or formulation of chemical products or arti-cles using technologies related to mixing and blending of solid or liquid materials, and where the process is in stages and provides the opportunity for significant con-tact at any stage	
	ECETOC TRA Worker v2.0 with modifications	
Assessment Method	(see 1. General remarks)	
For further details on OCs and RMM	,	
1.16.1.2.3 Control of workers exposur		
Workers related free short title	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities.	
Use descriptor covered	PROC 8a	
Processes, tasks, activities covered	Sampling, loading, filling, transfer, dumping, bagging in non- dedicated facilities. Exposure related to dust, vapour, aerosols or spillage, and cleaning of equipment to be expected.	
	ECETOC TRA Worker v2.0 with modifications	
Assessment Method	(see 1. General Remarks)	
For further details on OCs and RMMs see Table 53		
1.16.1.2.4 Control of workers exposure for PROC 8b and 9		
1.16.1.2.4 Control of workers exposur	re for PROC 8b and 9	
1.16.1.2.4 Control of workers exposured workers related free short title	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities. Transfer of substance or preparation into small containers (dedicated filling line, including	
Workers related free short title	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities. Transfer of substance or preparation into small	
	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities. Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	
Workers related free short title Use descriptor covered Processes, tasks, activities covered	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities. Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC 8b and 9 Sampling, loading, filling, transfer, dumping, bagging in dedicated facilities. Exposure related to dust, vapour, aerosols or spillage, and cleaning of equipment to be expected. Filling lines specifically designed to both capture vapour and aerosol emissions and minimise	
Workers related free short title Use descriptor covered	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities. Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC 8b and 9 Sampling, loading, filling, transfer, dumping, bagging in dedicated facilities. Exposure related to dust, vapour, aerosols or spillage, and cleaning of equipment to be expected. Filling lines specifically designed to both capture vapour and aerosol emissions and minimise spillage	
Workers related free short title Use descriptor covered Processes, tasks, activities covered	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities. Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC 8b and 9 Sampling, loading, filling, transfer, dumping, bagging in dedicated facilities. Exposure related to dust, vapour, aerosols or spillage, and cleaning of equipment to be expected. Filling lines specifically designed to both capture vapour and aerosol emissions and minimise spillage ECETOC TRA Worker v2.0 with modifications (see 1. General remarks)	
Workers related free short title Use descriptor covered Processes, tasks, activities covered Assessment Method	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities. Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC 8b and 9 Sampling, loading, filling, transfer, dumping, bagging in dedicated facilities. Exposure related to dust, vapour, aerosols or spillage, and cleaning of equipment to be expected. Filling lines specifically designed to both capture vapour and aerosol emissions and minimise spillage ECETOC TRA Worker v2.0 with modifications (see 1. General remarks) Is see Table 53	
Workers related free short title Use descriptor covered Processes, tasks, activities covered Assessment Method For further details on OCs and RMM	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities. Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC 8b and 9 Sampling, loading, filling, transfer, dumping, bagging in dedicated facilities. Exposure related to dust, vapour, aerosols or spillage, and cleaning of equipment to be expected. Filling lines specifically designed to both capture vapour and aerosol emissions and minimise spillage ECETOC TRA Worker v2.0 with modifications (see 1. General remarks) Is see Table 53	
Workers related free short title Use descriptor covered Processes, tasks, activities covered Assessment Method For further details on OCs and RMM 1.16.1.2.5 Control of workers exposure	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities. Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC 8b and 9 Sampling, loading, filling, transfer, dumping, bagging in dedicated facilities. Exposure related to dust, vapour, aerosols or spillage, and cleaning of equipment to be expected. Filling lines specifically designed to both capture vapour and aerosol emissions and minimise spillage ECETOC TRA Worker v2.0 with modifications (see 1. General remarks) Is see Table 53 Te for PROC 10	

Processes, tasks, activities covered	Low energy spreading of e.g. coatings. Including cleaning of surfaces. Substance can be inhaled as vapours, skin contact can occur through droplets, splashes, working with wipes and handling of treated surfaces.
	ECETOC TRA Worker v2.0 with modifications
Assessment Method	(see 1. General remarks)
For further details on OCs and RMM	Is see Table 53
1.16.1.2.6 Control of workers exposur	re for PROC 11
Workers related free short title	Non industrial spraying
Use descriptor covered	PROC 11
	Air dispersive techniques
Processes, tasks, activities covered	Spraying for surface coating, adhesives, polishes/cleaners, air care products, sandblasting
1 Tocesses, tasks, activities covered	Substances can be inhaled as aerosols. The energy of the aerosol particles may require advanced exposure controls.
Assessment Method	Stoffenmanager v4.0 and RISKOFDERMv2.1
For further details on OCs and RMM	Is see Table 53
1.16.1.2.7 Control of workers exposur	re for PROC 13
Workers related free short title	Treatment of articles by dipping and pouring.
Use descriptor covered	PROC 13
Processes, tasks, activities covered	Immersion operations. Treatment of articles by dipping, pouring, immersing, soaking, washing out or washing in substances; including cold formation or resin type matrix. Includes handling of treated objects (e.g. after dying, plating,). Substance is applied to a surface by low energy techniques such as dipping the article into a bath or pouring a preparation onto a surface.
A annual Markey	ECETOC TRA Worker v2.0 with modifications
Assessment Method	(see 1. General remarks)
For further details on OCs and RMM	Is see Table 53
1.16.1.2.8 Control of workers exposur	re for PROC 17
Workers related free short title	Lubrication at high energy conditions and in partly open process.
Use descriptor covered	PROC 17
Processes, tasks, activities covered	Lubrication at high energy conditions (temperature, friction) between moving parts and substance; significant part of process is open to workers.
Assessment Method	ECETOC TRA workers (v2.0) modified

		(see	(see 1. General remarks)			
Product characteristic						
Physical state		Liq	uid			
Fugacity		Lov	W			
Concentration of substance		100)		%	
Vapour pressure of the substar	nce	0.0	08		hPa	
Amounts used		•				
Not relevant						
Frequency and duration of u	ıse/exp	osure				
Duration of exposure		> 4		hours/day		
Frequency of exposure		≤ 2·	≤ 240 days/year			
Human factors not influence	d by r	isk mar	k management			
Exposed skin surface	Both	hands (ands (960 cm²)			
Other given operational cond	ditions	s affecti	ng w	orkers exposui	·e	
Location	I					
Domain	Prof		rofessional			
Technical conditions and me	asure	s at pro	cess	level (source) to	prevent release	
None						
Technical conditions and n	neasui	es to c	ontr	ol dispersion 1	from source towards the	
Local exhaust ventilation Ye		Yes	es		Effectiveness: 80%	
In case no Local exhaust vent effectiveness is required.	ilation	is prese	ent a	suitable respira	tory protection of adequate	
Organisational measures to	prevei	nt /limit	rele	ases, dispersion	and exposure	
Not relevant for ECETOC TR						
Conditions and measures rel	ated t	o persoi	nal p	rotection, hygi	ene and health evaluation	
Respiratory protection required	No					
Use of suitable gloves	Yes		Effectiveness: 90%			

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

Use of tightly fitting safety goggles

(The substance has shown to cause mucosal irritations at relatively high concentrations. Thus, it is recommended to protect the eyes)

1.16.2 Exposure Estimation

1.16.2.1. Workers exposure

For the estimated exposure for workers / PROC 1 see Table 54
For the estimated exposure for workers / PROC 2 see Table 55
For the estimated exposure for workers / PROC 3 see Table 56
For the estimated exposure for workers / PROC 5 see Table 58
For the estimated exposure for workers / PROC 8a see Table 59
For the estimated exposure for workers / PROC 8b see Table 60
For the estimated exposure for workers / PROC 10 see Table 62
For the estimated exposure for workers / PROC 11 see Table 63
For the estimated exposure for workers / PROC 13 see Table 64

Table 110: Estimated exposure for workers – PROC 17

Route of exposure	Concentrations		Justification
	Value Unit		
Long-term exposure, systemic/local, inhalative	22.10	mg/m³	NA
Long-term exposure, systemic, dermal	2.74	mg/kg bw/d	NA

NA = Not applicable

1.16.2.2. Consumer exposure

Not applicable

1.16.2.3. Indirect exposure of humans via the environment (oral)

The bioaccumulation potential of this substance is very low, with a Kow of 0.0339; therefore, indirect exposure of humans via the environment can be considered negligible.

1.16.2.4. Environmental exposure

The environmental exposure scenario is evaluated below. Exposure has been estimated using the version of the ECETOC TRA Integrated Tool current at the time of preparation of this document.

Table 111: Environmental Exposure Scenario ES16-E1

Section 1	Operational conditions and risk management measures
Section 1.2	Control of environmental exposure
Identifier*	ES16-E1
Contributing scenario	Use In Metal Working Fluids
Environmental Release Category	ERC8a
Specific ERC	
Assessment scenario	
Operational Conditions	
Amounts used	
Amounts used in the EU (tonnes/year)	200,000 (total industry tonnage for use in production of polymers)
Fraction of EU tonnage used in region	0.1
Fraction of main source to local environment	0.002
Fraction of substance in end-use products	1
Maximum daily site tonnage (kg/day)	1,096
Frequency and duration of use	
Type of release	Continuous
Emission days (days/year)	365 – ERC8a
Site specific monitoring data results for surface water effluent	
Location of sample	
Environmental factors not influenced by risk management	
Local freshwater dilution factor	10 (default)
Local marine water dilution factor	100 (default)
Other given operational conditions affecting environmental exposure	
Risk Management Measures	
Technical conditions and measures at	
process level (source) to prevent release	
- · · · · · · · · · · · ·	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Treat air emissions to provide a typical removal efficiency of (%)	
Treat wastewater (prior to discharge to receiving water) to provide the required removal efficiency of (%) ETotal,RMM = $1 - ((1 - ERMM, 1) \times (1 - ERMM, 2))$	87%

Organizational measures to prevent/limit release from site Conditions and measures related to municipal sewage treatment plant Conditions and measures related to external treatment of waste for disposal Conditions and measures related to external recovery of waste	
Other environmental control measures additional to above	
Identifier	ES16-E1
Narrative	Release fraction derived from ERC (8a)
Release fraction to air from process	1.00E+00
Release fraction to wastewater from process	1.00E+00
Release fraction to soil from process (regional only)	0.00E+00
Local release to air (kg/d)	1.10E+02
Local release to sewage (kg/d)	1.10E+02
Local release to soil (kg/d)	0.00E+00
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	
Total efficiency of removal from air emissions (%)	
The maximum allowable site tonnage (M_{Safe}) based on removal from domestic sewage treatment (kg/d)	7,387

1.16.2.4.1 Predicted exposure concentrations in the STP and in the aquatic compartments (freshwater, seawater and sediments)

Table 112: Predicted exposure concentrations in the STP and in the aquatic compartments (freshwater, seawater and sediments)

Local Concentration, Compartment: STP		
and aquatic	unit	ES16-E1
Local PEC in surface water during emission episode (dissolved)	mg/L	8.202E-01
Annual average local PEC in surface water (dissolved)	mg/L	8.202E-01
Local PEC in fresh water sediment during emission episode	mg/kg dwt	3.100E+00
Local PEC in sea water during emission episode	mg/L	8.191E-02
Annual average local PEC in sea water (dissolved)	mg/L	8.191E-02

Local PEC in	marine	sediment	during	mg/kg	3.096E-01
emission episode				dwt	
PEC for microorganisms in STP					6.935E+00
Comments					

1.16.2.4.2 Predicted exposure concentration in soils

Table 113: Predicted exposure concentration in soils

Local Concentration, Compartment: soil	unit	ES16-E1
Local PEC in agricultural soil, averaged over	mg/kg	1.877E-01
30 days	dwt	1 (02) 01
Local PEC agricultural soil, averaged over 180 days	mg/kg dwt	1.693E-01
Local PEC in grass land, averaged over 180 days	mg.kg dwt	1.647E-01
Comments		

1.16.2.4.3 Predicted exposure concentration in the atmospheric compartment

Table 114: Predicted exposure concnetration in the atmospheris compartment

Local	Concentration,		
Compartment: a	iir	unit	ES16-E1
Annual average (total)	local PEC in air	kg/m ³	1.081E-10
Comments			

1.16.2.4.4 Predicted exposure concentration in food for secondary poisoning

The bioaccumulation potential of this substance is very low, therefore secondary poisoning can be considered negligible. The Kow for DEG is 0.0339.

1.17 Use in/as Functional fluids (industrial)

1.17.1 Exposure Scenario 17

General Remarks

The relevant OCs used for calculation of environmental exposure are mentioned under paragraph 1.17.2.4.

Table 115: Description of ES 17

Table 115: Description of ES 1/		
Reference Number	17	
1.17.1.1 Title		
Free short title	Use in / as functional fluids (industrial)	
Systematic title based on use descriptor	SU3; PROC 1, 2, 3, 4, 8a, 8b, and 9; ERC 7	
1.17.1.2 Operational conditions a	nd Risk management measures	
1.17.1.2.1 Control of workers exposure for PROC 1		
Workers related free short title	Use in closed process, no likelihood of exposure	
Use descriptor covered	PROC 1	
Processes, tasks, activities covered Use of the substance in high integrity cont system where little potential exists for expose e.g. any sampling via closed loop systems		
Assessment Method	ECETOC TRA Worker v2.0 with modifications	
Assessment Method	(see 1. General remarks)	
For further details on OCs and R	MMs see Table 14	
1.17.1.2.2 Control of workers exp	osure for PROC 2	
Workers related free short title Use in closed, continuous process with occasional controlled exposure		
Use descriptor covered PROC 2		
Processes, tasks, activities covered Continuous process but where the dephilosophy is not specifically aimed at minimal emissions. Occasional exposure will arise through maintenance, sampling and equipment breakages		
Assessment Method	ECETOC TRA Worker v2.0 with modifications	
Assessment Method	(see 1. General remarks)	
For further details on OCs and RMMs see Table 14		
1.17.1.2.3 Control of workers exposure for PROC 3 and 4		
Workers related free short title	Use in closed batch process (synthesis or formulation).	
	Use in batch and other process (synthesis) where opportunity for exposure arises.	

Use descriptor covered	PROC 3 and 4		
Processes tasks activities covered	Batch manufacture of a chemical or formulation where the predominant handling is in a contained manner, e.g. through enclosed transfers, but where some opportunity for contact with chemicals occurs, e.g. through sampling		
Processes, tasks, activities covered	Use in batch manufacture of a chemical where significant opportunity for exposure arises, e.g. during charging, sampling or discharge of material, and when the nature of the design is likely to result in exposure.		
Assessment Method	ECETOC TRA Worker v2.0 with modifications		
Assessment victiou	(see 1. General remarks)		
For further details on OCs and RMM	Is see Table 2		
1.17.1.2.4 Control of workers exposure	re for PROC 8a		
Workers related free short title	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities.		
Use descriptor covered	PROC 8a		
Processes, tasks, activities covered	Sampling, loading, filling, transfer, dumping, bagging in non- dedicated facilities. Exposure related to dust, vapour, aerosols or spillage, and cleaning of equipment to be expected.		
Aggaggman4 Mathad	ECETOC TRA Worker v2.0 with modifications		
Assessment Method	(see 1. General remarks)		
For further details on OCs and RMM	Is see Table 2		
1.17.1.2.5 Control of workers exposur	re for PROC 8b		
Workers related free short title	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities.		
Use descriptor covered	PROC 8b		
Processes, tasks, activities covered	Sampling, loading, filling, transfer, dumping, bagging in dedicated facilities. Exposure related to dust, vapour, aerosols or spillage, and cleaning of equipment to be expected.		
Assessment Method	ECETOC TRA Worker v2.0 with modifications		
Assessment Method	(see 1. General remarks)		
For further details on OCs and RMMs see Table 2			
1.17.1.2.6 Control of workers exposur			
	Transfer of substance or preparation into small		
Workers related free short title	containers (dedicated filling line, including weighing) PROC 9		

Processes, tasks, activities covered	Filling lines specifically designed to both capture vapour and aerosol emissions and minimise spillage	
Assessment Method	ECETOC TRA Worker v2.0 with modifications	
Assessment Method	(see 1. General remarks)	
For further details on OCs and RMMs see Table 14		

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

Use of tightly fitting safety goggles

(The substance has shown to cause mucosal irritations at relatively high concentrations. Thus, it is recommended to protect the eyes)

1.17.2 Exposure Estimation

1.17.2.1. Workers exposure

For the estimated exposure for workers / PROC 1 see Table 15 For the estimated exposure for workers / PROC 2 see Table 16 For the estimated exposure for workers / PROC 3 see Table 5 For the estimated exposure for workers / PROC 4 see Table 6 For the estimated exposure for workers / PROC 8a see Table 7 For the estimated exposure for workers / PROC 8b see Table 8 For the estimated exposure for workers / PROC 9 see Table 18

1.17.2.2. Consumer exposure

Not applicable

1.17.2.3. Indirect exposure of humans via the environment (oral)

The bioaccumulation potential of this substance is very low, with a Kow of 0.0339; therefore, indirect exposure of humans via the environment can be considered negligible.

1.17.2.4. Environmental exposure

Table 116: Environmental Exposure Scenario ES17-E1

Section 1	Operational conditions and risk management measures
Section 1.2	Control of environmental exposure
Identifier*	ES17-E1
Contributing scenario	Use In/As Functional Fluids
Environmental Release Category	ERC7
Specific ERC	ESVOC 31

Assessment scenario	
Operational Conditions	
Amounts used	
Amounts used in the EU (tonnes/year)	200,000
	(total industry tonnage for use in production of
	polymers)
Fraction of EU tonnage used in region	1
Fraction of main source to local	0.00005
environment	
Fraction of substance in end-use products	1
Maximum daily site tonnage (kg/day)	500
Frequency and duration of use	
Type of release	Continuous
Emission days (days/year)	20 - ESVOC 31
Site specific monitoring data results for	
surface water effluent	
Location of sample	
Environmental factors not influenced by	
risk management	
Local freshwater dilution factor	10 (default)
Local marine water dilution factor	100 (default)
Other given operational conditions	
affecting environmental exposure	
Risk Management Measures	
Technical conditions and measures at	
process level (source) to prevent release	
Technical onsite conditions and	
measures to reduce or limit discharges,	
air emissions and releases to soil	
Treat air emissions to provide a typical	
removal efficiency of (%)	
Treat wastewater (prior to discharge to	87%
receiving water) to provide the required	
removal efficiency of (%) ETotal,RMM =	
1 – ((1 – ERMM, 1) x (1 – ERMM,2))	
Organizational measures to prevent/limit release from site	
Conditions and measures related to	
municipal sewage treatment plant	
Conditions and measures related to	
external treatment of waste for disposal	
Conditions and measures related to	
external recovery of waste	

Other environmental control measures additional to above	
Identifier	ES17-E1
Narrative	Release fraction derived from SpERC (ESVOC 31)
Release fraction to air from process	1.00E-04
Release fraction to wastewater from process	1.00E-03
Release fraction to soil from process (regional only)	1.00E-03
Local release to air (kg/d)	5.00E-02
Local release to sewage (kg/d)	5.00E-01
Local release to soil (kg/d)	5.00E-01
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	
Total efficiency of removal from air emissions (%)	
The maximum allowable site tonnage (M_{Safe}) based on removal from domestic sewage treatment (kg/d)	631,657
Scaling	

The downstream user can check the compliance of his site by comparing site specific data with defaults used in the exposure assessment. The site specific quotient should be inferior or equal to the spERC quotient.

$$\frac{m_{\text{spERC}}^{*}(1-E_{\text{ER,spERC}})*F_{\text{releasespERC}}}{DF_{\text{spERC}}} \ge \frac{m_{\text{site}}^{*}(1-E_{\text{ER,site}})*F_{\text{releasesite}}}{DF_{\text{site}}}$$

 m_{spERC} : Substance use rate in spERC $E_{ER,spERC}$: Efficacy of RMM in spERC $F_{release,..spERC}$: Initial release fraction in

spERC

DF_{spERC}: dilution factor of STP effluent in

river

 m_{site} : Substance use rate at site $E_{ER,site}$: Efficacy of RMM at site

 $F_{release,,site}$: Initial release fraction at site DF_{site} : dilution factor of STP effluent in

river

1.17.2.4.1 Predicted exposure concentrations in the STP and in the aquatic compartments (freshwater, seawater and sediments)

Table 117: Predicted exposure concentrations in the STP and in the aquatic compartments (frshwater, seawater and sediments)

Local Concentration, Compartment: STP		
and aquatic	unit	ES17-E1
Local PEC in surface water during emission	mg/L	4.376E-03
episode (dissolved)		
Annual average local PEC in surface water	mg/L	1.386E-03
(dissolved)		
Local PEC in fresh water sediment during	mg/kg	1.654E-02
emission episode	dwt	
Local PEC in sea water during emission	mg/L	4.318E-04
episode		
Annual average local PEC in sea water	mg/L	1.328E-04
(dissolved)		
Local PEC in marine sediment during	mg/kg	1.632E-03
emission episode	dwt	
PEC for microorganisms in STP	mg/L	3.164E-02
Comments		

1.17.2.4.2 Predicted exposure concentration in soils

Table 118: Predicted exposure concentration in soils

Local Concentration, Compartment: soil	unit	ES17-E1
Local PEC in agricultural soil, averaged over 30 days	mg/kg dwt	2.887E-04
Local PEC agricultural soil, averaged over 180 days	mg/kg dwt	2.049E-04
Local PEC in grass land, averaged over 180 days	mg.kg dwt	1.840E-04
Comments		

1.17.2.4.3 Predicted exposure concentration in the atmospheric compartment

Table 119: Predicted exposure concentration in the atmospheric compartment

Local	Concentration,		
Compartment: a	ıir	unit	ES17-E1
Annual average (total)	local PEC in air	kg/m ³	8.775E-13
Comments			

1.17.2.4.4 Predicted exposure concentration in food for secondary poisoning

The bioaccumulation potential of this substance is very low, therefore secondary poisoning can be considered negligible. The Kow for DEG is 0.0339.

1.18 Use in/as Functional fluids (professional)

1.18.1 Exposure Scenario

General Remarks

The relevant OCs used for calculation of environmental exposure are mentioned under paragraph 1.18.2.4.

Table 120: Description of ES 18

Reference Number	18	
1.18.1.1 Title		
Free short title	Use in/as functional fluids (professional)	
Systematic title based on use descriptor	SU22; PROC 1, 2, 3, 4, 8a, 9, and 20; ERC 9b	
1.18.1.2 Operational conditions a	and Risk management measures	
1.18.1.2.1Control of workers exp	osure for PROC 1, 2, 3	
	Use in closed process, no likelihood of exposure.	
Workers related free short title	Use in closed, continuous process with occasional controlled exposure.	
	Use in closed batch process (synthesis or formulation).	
Use descriptor covered PROC 1, 2, 3		
	Use of the substances in high integrity contained system where little potential exists for exposures, e.g. any sampling via closed loop systems. Continuous process but where the design	
Processes, tasks, activities covere	philosophy is not specifically aimed at minimizing emissions. It is not high integrity and occasional expose will arise e.g. through maintenance, sampling and equipment breakages.	
	Batch manufacture of a chemical or formulation where the predominant handling is in a contained manner, e.g. through enclosed transfers, but where some opportunity for contact with chemicals occurs, e.g. through sampling.	
Assassment Method	ECETOC TRA workers (v2.0) modified	
Assessment Method	(see 1. Genral remarks)	
For further details on OCs and RMMs see Table 53		
1.8.1.2.2 Control of workers expe	osure for PROC 4	
Workers related free short title	Use in batch and other process (synthesis) where opportunity for exposure arises.	
Use descriptor covered	PROC 4	

Processes, tasks, activities covered	Use in batch manufacture of a chemical when significant opportunity for exposure arises, e.g during charging, sampling or discharge of material, and when the nature of the design likely to result in exposure.		
	ECETOC TRA Worker v2.0 with modifications		
Assessment Method	(see 1. General remarks)		
For further details on OCs and RMM	,		
1.18.1.2.3 Control of workers exposur	re for PROC 8a		
Workers related free short title	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities.		
Use descriptor covered	PROC 8a		
Processes, tasks, activities covered	Sampling, loading, filling, transfer, dumping bagging in non- dedicated facilities. Exposur related to dust, vapour, aerosols or spillage, an cleaning of equipment to be expected.		
	ECETOC TRA Worker v2.0 with modifications		
Assessment Method	(see 1. General Remarks)		
For further details on OCs and RMM	Is see Table 53		
1.18.1.2.4 Control of workers exposur	re for PROC 9		
Workers related free short title	Transfer of substance or preparation into small containers (dedicated filling line, including weighing).		
Use descriptor covered	PROC 9		
Processes, tasks, activities covered	Filling lines specifically designed to both capture vapour and aerosol emissions and minimis spillage.		
A (M.)	ECETOC TRA Worker v2.0 with modifications		
Assessment Method	(see 1. General remarks)		
For further details on OCs and RMMs see Table 53			
1.18.1.2.4 Control of workers exposur	re for PROC 20		
Workers related free short title	Heat and pressure transfer fluids in dispersive, professional use but closed systems.		
Use descriptor covered	PROC 20		
	Motor and engine oils, brake fluids.		
Processes, tasks, activities covered	Also in these applications, the lubricant may be exposed to high energy conditions and chemical reactions may take place during use. Exhausted fluids need to be disposed of as waste. Repair and maintenance may lead to skin contact.		

Assessment Method		ECETOC TRA Worker v2.0 with modifications			
		(see 1.	(see 1. General remarks)		
Product characteristic					
Physical state		Liquid			
Fugacity			v		
Concentration of substance		100			%
Vapour pressure of the substance	e	0.008			hPa
Amounts used					
Not relevant					
Frequency and duration of us	e/expos	sure			
Duration of exposure		>4			hours/day
Frequency of exposure	Frequency of exposure				days/year
Human factors not influenced	by risl	k manag	ement		
Exposed skin surface P	Exposed skin surface Palm of both hands (480 cm ²)				
Other given operational conditions affecting workers exposure					
Location	ntion Indoor				
Domain Professional					
Technical conditions and mea	sures a	t proces	s level (sour	ce) to p	prevent release
None					
Technical conditions and measures to control dispersion from source towards the worker					
Local exhaust ventilation	N	No			
Organisational measures to prevent /limit releases, dispersion and exposure					
Not relevant for ECETOC TRA					
Conditions and measures related to personal protection, hygiene and health evaluation					
Respiratory protection required	No				
Use of suitable gloves	No				

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

Use of tightly fitting safety goggles

(The substance has shown to cause mucosal irritations at relatively high concentrations. Thus, it is recommended to protect the eyes)

1.18.2 Exposure Estimation

1.18.2.1. Workers exposure

For the estimated exposure for workers / PROC 1 see Table 54
For the estimated exposure for workers / PROC 2 see Table 55
For the estimated exposure for workers / PROC 3 see Table 56
For the estimated exposure for workers / PROC 4 see Table 57
For the estimated exposure for workers / PROC 8a see Table 59
For the estimated exposure for workers / PROC 9 see Table 61

Table 121: Estimated exposure for workers – PROC 20

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Route of exposure	Concentrations		Concentrations		Justification
	Value	Unit			
Long-term exposure, systemic/local, inhalative	22.10	mg/m³	NA		
Long-term exposure, systemic, dermal	1.71	mg/kg bw/d	NA		

NA = Not applicable

1.18.2.2. Consumer exposure

Not applicable

1.18.2.3. Indirect exposure of humans via the environment (oral)

The bioaccumulation potential of this substance is very low, with a Kow of 0.0339; therefore, indirect exposure of humans via the environment can be considered negligible.

1.18.2.4. Environmental exposure

Table 122: Environmental Exposure Scenario ES18-E1

Section 1	Operational conditions and risk management measures		
Section 1.2	Control of environmental exposure		
Identifier*	ES18-E1		
Contributing scenario	Use In/As Functional Fluids		
Environmental Release Category	ERC9b		
Specific ERC			
Assessment scenario			
Operational Conditions			
Amounts used			

Amounts used in the EU (tonnes/year)	200,000
(1)	(total industry tonnage for use in production of
	polymers)
Fraction of EU tonnage used in region	0.1
Fraction of main source to local	0.002
environment	
Fraction of substance in end-use products	1
Maximum daily site tonnage (kg/day)	1,096
Frequency and duration of use	
Type of release	Continuous
Emission days (days/year)	365 - ERC9b
Site specific monitoring data results for surface water effluent	
Location of sample	
<u> </u>	
Environmental factors not influenced by risk management	
Local freshwater dilution factor	10 (default)
Local marine water dilution factor	100 (default)
Other given operational conditions	100 (dvidait)
affecting environmental exposure	
Risk Management Measures	
Technical conditions and measures at	
process level (source) to prevent release	
Technical onsite conditions and	
measures to reduce or limit discharges,	
air emissions and releases to soil	
Treat air emissions to provide a typical	
removal efficiency of (%)	
Treat wastewater (prior to discharge to	87%
receiving water) to provide the required	
removal efficiency of (%) ETotal,RMM = 1 – ((1 – ERMM, 1) x (1 – ERMM,2))	
Organizational measures to	
prevent/limit release from site	
Conditions and measures related to	
municipal sewage treatment plant	
Conditions and measures related to	
external treatment of waste for disposal	
Conditions and measures related to	
external recovery of waste	
Other environmental control measures	
additional to above	
Identifier	ES18-E1
Narrative	Release fraction derived from ERC (9b)
rvarrative	Release fraction derived from ERC (90)

Release fraction to air from process	5.00E-02
Release fraction to wastewater from	5.00E-02
process	
Release fraction to soil from process	5.00E-02
(regional only)	
Local release to air (kg/d)	5.48E+00
Local release to sewage (kg/d)	5.48E+00
Local release to soil (kg/d)	5.48E+00
Total efficiency of removal from	
wastewater after onsite and offsite	
(domestic treatment plant) RMMs (%)	
Total efficiency of removal from air	
emissions (%)	
The maximum allowable site tonnage	139,337
(M _{Safe}) based on removal from domestic	
sewage treatment (kg/d)	

1.18.2.4.1 Predicted exposure concentrations in the STP and in the aquatic compartments (freshwater, seawater and sediments)

Table 123: Predicted exposure concentrations in the STP and in the aquatic compartments (freshwater, seawater and sediments)

Local Concentration, Compartment: STP		
and aquatic	unit	ES18-E1
Local PEC in surface water during emission	mg/L	4.348E-02
episode (dissolved)		
Annual average local PEC in surface water	mg/L	4.348E-02
(dissolved)		
Local PEC in fresh water sediment during	mg/kg	1.644E-01
emission episode	dwt	
Local PEC in sea water during emission	mg/L	4.327E-03
episode		
Annual average local PEC in sea water	mg/L	4.327E-03
(dissolved)		
Local PEC in marine sediment during	mg/kg	1.636E-02
emission episode	dwt	
PEC for microorganisms in STP	mg/L	3.467E-01
Comments		

1.18.2.4.2 Predicted exposure concentration in soils

Table 124: Predicted exposure concentration in soils

Local Concentration, Compartment: soil	unit	ES18-E1
Local PEC in agricultural soil, averaged over 30 days	mg/kg dwt	9.443E-03
Local PEC agricultural soil, averaged over 180 days	mg/kg dwt	8.523E-03
Local PEC in grass land, averaged over 180 days	mg.kg dwt	8.294E-03
Comments		

1.18.2.4.3 Predicted exposure concentration in the atmospheric compartment

Table 125: Predicted exposure concentration in the atmospheris compartment

Local	Concentration,		
Compartment: ai	ir	unit	ES18-E1
Annual average l (total)	local PEC in air	kg/m ³	5.444E-12
Comments			

1.18.2.4.4 Predicted exposure concentration in food for secondary poisoning

The bioaccumulation potential of this substance is very low, therefore secondary poisoning can be considered negligible. The Kow for DEG is 0.0339.

1.19 Use in Heat transfer and Hydraulic fluids (Consumer use)

General remarks

Generally, heat transfer and hydraulic fluids are products being in closed systems. Thus, exposure towards the substance is considered to be negligible within that stage of use. Relevant exposure may occur during charging and/or discharging.

Several scenarios (default databases) in ConsExpo 4.1 address a "Mixing and Loading" step. However, usually these scenarios are based on the assumption that relatively small amounts of prooduct (<100g) are charged. Regarding the charging/discharging of heat transfer and hydraulic fluids presumably greater amounts of product are handled. Thus, the exposure resulting from charging/discharging of heat transfer and hydraulic fluids is assessed by means of a calculation of PROC 8a for the professional domain which is considered to represent the charging/discharging process performed by consumers in a appropriate way.

To calculate PROC 8a the ECETOC TRA worker tool (v2.0) was used. Deviating from the ECETOC TRA calculation algorithms a direct multiplication of the basic estimate by the fraction of the substance in the preparation used was done. This approach is considered to be applicable due to the low volatility of the substance.

Oral exposure is regarded to be no relevant route of exposure for the ES.

1.19.1 Exposure Scenario 19

General Remarks

The relevant OCs used for calculation of environmental exposure are mentioned under paragraph 1.19.2.4.

Table 126: Description of the ES 19

1)		
19		
1.19.1.1. Title		
Use in Heat transfer and Hydraulic fluids (Consumer use)		
SU21; PC 16, PC17; (PROC8a); ERC 9b		
and r	isk management measures	
xposu	re for PC16 and PC17	
Use in Heat transfer and Hydraulic fluids		
PC16 and PC17		
ered see above (General Remarks);		
	ECETOC TRA (worker) v2.0 with modifications	
Assessment Method (see 1.19 General remarks)		
Product characteristic		
Physical state Liquid		
ostance max 45 %		
Vapour pressure of the substance 0.008 hPa		
	Use use) SU2 and rexposu	

Amounts used		
Not applicable		
Frequency and duration of use/exp	osure	
Duration of exposure	< 15 min	
Human factors not influenced by ri	sk management	
Evnesed skip surface	Both hands	
Exposed skin surface	(960 cm ²)	
Type of activity (inhalation rate)	Light activity	See footnote 1
Other given operational conditions	affecting consumers	exposure
Location	Inside	
Application temperature	25°C	
Conditions and measures related to	information and bel	havioural advice to consumers
Not applicable		
Conditions and measures related to	personal protection	and hygiene
Not applicable		

1.19.2 Exposure Estimation

1.19.2.1. Workers exposure

Not applicable.

1.19.2.2. Consumer exposure

Table 127: Estimated exposure for consumers / Contributing Scenario for PC16 and PC 17

Calculation tool used: ECETOC TRA (worker) v2.0

Route of exposure	dose / conc	Unit	Justification
Long-term exposure, systemic/local, inhalative	4.97	mg/m³	
Long-term exposure, systemic, dermal	6.17	mg/kg bw/d	
Long-term exposure, systemic, oral	NA	mg/kg bw/d	See 1.19 General remarks

1.19.2.3. Indirect exposure of humans via the environment (oral)

The bioaccumulation potential of this substance is very low, with a Kow of 0.0339; therefore, indirect exposure of humans via the environment can be considered negligible.

1.19.2.4. Environmental exposure

The environmental exposure scenario is covered under the environmental assessment for Exposure Scenario 18 (Use in/as functional fluids (professional)) in Section 1.18.2.4.

1.20 Use in/as De-icing/Anti-icing applications/agents (professional)

1.20.1 Exposure Scenario 20

General Remarks

The relevant OCs used for calculation of environmental exposure are mentioned under paragraph 1.20.2.4.

Table	128:	Description	of ES 20
Labic	140.	DUSCHIBUIUM	UI 12/2 /2/2

Reference Number	20	
1.20.1.1 Title		
Free short title	Use in/as de-icing/anti-icing applications/agents (professional)	
Systematic title based on use descriptor	SU22; PROC 1, 2, 8a, 8b, and 11; ERC 8d	
1.20.1.2 Operational conditions a	and Risk management measures	
1.20.1.2.1Control of workers exp	osure for PROC 1 and 2	
	Use in closed process, no likelihood of exposure.	
Workers related free short title	Use in closed, continuous process with occasional controlled exposure.	
Use descriptor covered	PROC 1 and 2	
Processes, tasks, activities covere	Use of the substances in high integrity contained system where little potential exists for exposures, e.g. any sampling via closed loop systems. Continuous process but where the design philosophy is not specifically aimed at minimizing emissions. It is not high integrity and occasional expose will arise e.g. through maintenance, sampling and equipment breakages.	
A AM A 1	ECETOC TRA workers (v2.0) modified	
Assessment Method	(see 1. Genral remarks)	
For further details on OCs and I	RMMs see Table 53	
1.20.1.2.2 Control of workers exp	osure for PROC 8a	
Workers related free short title Transfer of substance or preparation (charging/discharging) from/to vessels containers at non-dedicated facilities.		
Use descriptor covered	PROC 8a	
Processes, tasks, activities covere	Sampling, loading, filling, transfer, dumping, bagging in non- dedicated facilities. Exposure related to dust, vapour, aerosols or spillage, and	

cleaning of equipment to be expected.		
	ECETOC TRA Worker v2.0 with modifications	
Assessment Method	(see 1. General Remarks)	
For further details on OCs and RMM	Is see Table 53	
1.20.1.2.3 Control of workers exposur	re for PROC 8b	
Workers related free short title	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities.	
Use descriptor covered	PROC 8b	
Processes, tasks, activities covered	Sampling, loading, filling, transfer, dumping, bagging in dedicated facilities. Exposure related to dust, vapour, aerosols or spillage, and cleaning of equipment to be expected.	
A annual Markey d	ECETOC TRA Worker v2.0 with modifications	
Assessment Method	(see 1. General remarks)	
For further details on OCs and RMM	Is see Table 53	
1.20.1.2.4 Control of workers exposur	re for PROC 11	
Workers related free short title	Non industrial spraying	
Use descriptor covered	PROC 11	
	Air dispersive techniques	
Processes, tasks, activities covered	Spraying for surface coating, adhesives, polishes/cleaners, air care products, sandblasting	
2 2 3 2 2 3 2 3 3 3 3 3 4 2 3 7 3 2 3 2 3 2 3 3 3 3 3 3 3 3 3 3 3	Substances can be inhaled as aerosols. The energy of the aerosol particles may require advanced exposure controls.	
Assessment Method	Stoffenmanager v4.0 and RISKOFDERMv2.1	
For further details on OCs and RMMs see Table 53		

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

Use of tightly fitting safety goggles

(The substance has shown to cause mucosal irritations at relatively high concentrations. Thus, it is recommended to protect the eyes)

1.20.2 Exposure Estimation

1.20.2.1. Workers exposure

For the estimated exposure for workers / PROC 1 see Table 54 For the estimated exposure for workers / PROC 2 see Table 55 For the estimated exposure for workers / PROC 8a see Table 59 For the estimated exposure for workers / PROC 8b see Table 60 For the estimated exposure for workers / PROC 11 see Table 63

1.20.2.2. Consumer exposure

Not applicable

1.20.2.3. Indirect exposure of humans via the environment (oral)

The bioaccumulation potential of this substance is very low, with a Kow of 0.0339; therefore, indirect exposure of humans via the environment can be considered negligible.

1.20.2.4. Environmental exposure

Table 129: Environmental Exposure Scenario ES20-E1

Section 1	Operational conditions and risk management measures
Section 1.2	Control of environmental exposure
Identifier*	ES20-E1
Contributing scenario	Use In/As De-Icing/Anti-Icing Applications/Agents
Environmental Release Category	ERC8d
Specific ERC	
Assessment scenario	
Operational Conditions	
Amounts used	
Amounts used in the EU (tonnes/year)	200,000 (total industry tonnage for use in production of polymers)
Fraction of EU tonnage used in region	0.1
Fraction of main source to local environment	0.002
Fraction of substance in end-use products	1
Maximum daily site tonnage (kg/day)	1,096
Frequency and duration of use	
Type of release	Continuous
Emission days (days/year)	365 – ERC8d
Site specific monitoring data results for surface water effluent	
Location of sample	
Environmental factors not influenced by risk management	
Local freshwater dilution factor	10 (default)
Local marine water dilution factor	100 (default)
Other given operational conditions	
affecting environmental exposure	
Risk Management Measures	
Technical conditions and measures at	
process level (source) to prevent release	

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Treat air emissions to provide a typical removal efficiency of (%)	
Treat wastewater (prior to discharge to receiving water) to provide the required removal efficiency of (%) ETotal,RMM = 1 - ((1 - ERMM, 1) x (1 - ERMM,2))	87%
Organizational measures to	
prevent/limit release from site	
Conditions and measures related to municipal sewage treatment plant	
Conditions and measures related to	
external treatment of waste for disposal	
Conditions and measures related to external recovery of waste	
Other environmental control measures additional to above	
	ES20-E1
additional to above	ES20-E1 Release fraction derived from ERC (8d)
additional to above Identifier	
additional to above Identifier Narrative	Release fraction derived from ERC (8d)
Additional to above Identifier Narrative Release fraction to air from process Release fraction to wastewater from	Release fraction derived from ERC (8d) 1.00E+00
Additional to above Identifier Narrative Release fraction to air from process Release fraction to wastewater from process Release fraction to soil from process (regional only)	Release fraction derived from ERC (8d) 1.00E+00 1.00E+00
Additional to above Identifier Narrative Release fraction to air from process Release fraction to wastewater from process Release fraction to soil from process	Release fraction derived from ERC (8d) 1.00E+00 1.00E+00 2.00E-01
Additional to above Identifier Narrative Release fraction to air from process Release fraction to wastewater from process Release fraction to soil from process (regional only) Local release to air (kg/d)	Release fraction derived from ERC (8d) 1.00E+00 1.00E+00 2.00E-01 1.10E+02
Identifier Narrative Release fraction to air from process Release fraction to wastewater from process Release fraction to soil from process (regional only) Local release to air (kg/d) Local release to sewage (kg/d) Local release to soil (kg/d) Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	Release fraction derived from ERC (8d) 1.00E+00 1.00E+00 2.00E-01 1.10E+02 1.10E+02
Additional to above Identifier Narrative Release fraction to air from process Release fraction to wastewater from process Release fraction to soil from process (regional only) Local release to air (kg/d) Local release to sewage (kg/d) Local release to soil (kg/d) Total efficiency of removal from wastewater after onsite and offsite	Release fraction derived from ERC (8d) 1.00E+00 1.00E+00 2.00E-01 1.10E+02 1.10E+02

1.20.2.4.1 Predicted exposure concentrations in the STP and in the aquatic compartments (freshwater, seawater and sediments)

Table 130: Predicted exposure concentrations in the STP and in the aquatic compartments (freshwater, seawater and sediments)

Local Concentration, Compartment: STP		
and aquatic	unit	ES20-E1
Local PEC in surface water during emission	mg/L	8.301E-01
episode (dissolved)		
Annual average local PEC in surface water	mg/L	8.301E-01
(dissolved)		
Local PEC in fresh water sediment during	mg/kg	3.138E+00
emission episode	dwt	
Local PEC in sea water during emission	mg/L	8.284E-02
episode		
Annual average local PEC in sea water	mg/L	8.284E-02
(dissolved)		
Local PEC in marine sediment during	mg/kg	3.131E-01
emission episode	dwt	
PEC for microorganisms in STP	mg/L	6.935E+00
Comments		

1.20.2.4.2 Predicted exposure concentration in soils

Table 131: Predicted exposure concentrations in soils

Local Concentration, Compartment: soil	unit	ES20-E1
Local PEC in agricultural soil, averaged over	mg/kg	1.879E-01
30 days	dwt	
Local PEC agricultural soil, averaged over	mg/kg	1.695E-01
180 days	dwt	
Local PEC in grass land, averaged over 180	mg.kg	1.650E-01
days	dwt	
Comments		

1.20.2.4.3 Predicted exposure concentration in the atmospheric compartment

Table 132: Predicted exposure concentration in the atmospheric compartment

Local Concentration,		
Compartment: air	unit	ES20-E1
Annual average local PEC in air (total)	kg/m ³	1.083E-10
Comments		

1.20.2.4.4 Predicted exposure concentration in food for secondary poisoning

The bioaccumulation potential of this substance is very low, therefore secondary poisoning can be considered negligible. The Kow for DEG is 0.0339.

1.21 Use in/as De-icing/Anti-icing applications/agents (Consumer Use)

General remarks

In order to assess products included in PC4 two Sub-Scenarios have been assessed.

Sub-Scenario 1: Use in de-icing applications/agents

Sub-Scenario 2: Use in anti-icing agents

These Sub-Scenarios are intended to represent reasonable worst case scenarios for PC4.

Sub-Scenario 1:

With view on different De-icing products (door lock de-icer, windshield de-icers, and others), de-icing of windows/windshields was considered to be a worst case scenario.

To calculate this scenario the ConsExpo 4.1 default database Cleaning and washing/Miscellaneous cleaning and washing products/Glass cleaner was used. The scenarios of using a glass cleaner was considered to be similar to the scenario of using a de-icing agent e.g. for windows/windshields.

Sub-Scenario 1 consists of two parts.

Part A considers the spraying of the product, whereas Part B considers the cleaning process.

Sub-Scenario 2:

Generally, anti-icing agents are products being in closed systems. Thus, exposure towards the substance is considered to be negligible within that stage of use. Relevant exposure may occur during charging and/or discharging.

Several scenarios (default databases) in ConsExpo 4.1 address a "Mixing and Loading" step. However, usually these scenarios are based on the assumption that relatively small amounts of product (<100g) are charged. Regarding the charging/discharging of anti-icing agents presumably greater amounts of product are handled. Thus, the exposure resulting from charging/discharging of heat transfer and hydraulic fluids is assessed by means of a calculation of PROC 8a for the professional domain which is considered to represent the charging/discharging process performed by consumers in a appropriate way. PROC 8a has been calculated as described under 1.19.

Oral exposure is regarded to be no relevant route of exposure for this ES.

1.21.1 Exposure Scenario

General Remarks

The relevant OCs used for calculation of environmental exposure are mentioned under paragraph 1.21.2.4.

Table 133: Description of the ES 21

Tuble 1001 Description of the Eb		
Reference Number	21	
1.21.1.1. Title		
Free short title	Use in/as de-icing/anti-icing applications/agents (Consumer use)	
Systematic title based on use descriptor	d on use SU21; PC 4; ERC 8d	
1.21.1.2. Operational conditions and risk management measures		

1.21.1.2.1 Control of consumer exposure for PC 4				
1.21.1.2.1.1 Sub-Scenario 1/Use in De-icing applications - spraying products				
Name of contributing scenario	e of contributing scenario Use in De-icing application – spraying products			
Use descriptor covered	PC 4			
D (1)	see above (General Re	marks);		
Processes, tasks, activities covered	see corresponding Fact	Sheet ¹		
	ConsExpo 4.1			
Assessment Method	Cleaning and Washi	Based on the ConsExpo default database for Cleaning and Washing/Miscellaneous cleaning and washing products/Glass cleaner		
Part A. Spraying				
Product characteristic				
Physical state	Liquid			
Concentration of substance	100 %			
Vapour pressure of the substance	0.008 hPa	0.008 hPa		
Airborn fraction	1.0			
Weight fraction non-volatile	1.0			
Density non-volatile	1.8 g/cm ³	(Default value)		
Amounts used				
Mass generation rate	0.78 g/s	(Default value)		
Frequency and duration of use/exposure				
Duration of spraying	0.7 min	(Default value)		
Duration of exposure	240 min	(Default value)		
Frequency of exposure	(Default value – nor relevant for to calculation of the mean concentration on day exposure)			
Human factors not influenced by ris	k management			
Inhalation cut-off diameter	15 μm	(Default value)		
Non-respirable uptake fraction	1	(Default value)		
Exposed skin surface	Hands and forearms (1900 cm ²)			
Contact rate	46 mg/min	(Default value)		
Release duration	42 s	(Default value)		
Type of activity (inhalation rate)	Light activity See footnote 2			
Other given operational conditions a	affecting consumers expo	osure		
Location	Inside			
Room volume	58 m³	(Default value)		

Room height	2.5 m	(Default value)			
Ventilation rate	0.5 per hour	(Default value)			
	25°C	(Delault Value)			
PP - W W. P. W W W W W					
	Conditions and measures related to information and behavioural advice to consumers				
Spraying away from exposed person	1 4 4 1	1 .			
Conditions and measures related to p	personal protection and	nygiene			
Not applicable					
Part B. Cleaning					
Product characteristic	Tr,				
Physical state	Liquid				
Concentration of substance	max. 100 %				
Vapour pressure of the substance	0.008 hPa				
Amounts used	1	T			
Applied amount	0.29 g/day	(Default value)			
Frequency and duration of use/expos	ure	1			
Frequency of exposure	365 days/year	(Default value – not relevant for the calculation of the mean concentration on day of exposure)			
Human factors not influenced by risk management					
Exposed skin surface	Palm of one hand (215 cm ²)	(Default value)			
Type of activity (inhalation rate)	Light activity	See footnote 2			
Other given operational conditions at	ffecting consumers exp	osure			
Application temperature	25°C				
Conditions and measures related to i	nformation and behavi	oural advice to consumers			
Not applicable					
Conditions and measures related to p	personal protection and	hygiene			
Not applicable					
1.21.1.2.1.2. Sub-Scenario 2/Use in A	nti-freezing agents				
Name of contributing scenario Use in Anti-freezing agents					
Use descriptor covered	PC4				
Processes, tasks, activities covered					
Assessment Method	ECETOC TRA (worker) v2.0 with modifications (see 1.19 and 19.21 General remarks)				
Product characteristic					
Physical state					
	1 1				

Concentration of substance	max 45 %		
Vapour pressure of the substance	0.008 hPa		
Amounts used			
Not applicable			
Frequency and duration of use/exp	osure		
Duration of exposure	< 15 min		
Human factors not influenced by ri	sk management	•	
F 11: C	Both hands		
Exposed skin surface	(960 cm ²)		
Type of activity (inhalation rate)	Light activity	See footnote 2	
Other given operational conditions affecting consumers exposure			
Location	Inside		
Application temperature	25°C		
Conditions and measures related to	information and beh	navioural advice to consumers	
Not applicable			
Conditions and measures related to	personal protection	and hygiene	
Not applicable			

1.21.2 Exposure Estimation

1.21.2.1. Workers exposure

Not applicable.

1.21.2.2. Consumer exposure

General Remarks

The Sub-scenarios "Use in De-icing agents-spraying products" consists of two parts (Part A: Spraying and Part B Cleaning). To calculate the exposure resulting in each Sub-Scenario the exposure estimates resulting from Part A and Part B are added.

Table 134: Estimated exposure for consumers / Contributing Scenario for PC4 Sub-Scenario/Use in De-icing agents-spraying products

Calculation tool used: ConsExpo 4.1

Route of exposure	dose / conc	Unit	Justification		
Part A. Spraying	Part A. Spraying				
Long-term exposure, systemic/local, inhalative	0.0007	mg/m³			
Long-term exposure, systemic, dermal	0.50	mg/kg bw/d			
Long-term exposure, systemic, oral	0.005	mg/kg bw/d			
Part B. Cleaning					
Long-term exposure, systemic/local, inhalative	NA	mg/m³			
Long-term exposure, systemic, dermal	4.46	mg/kg bw/d			
Long-term exposure, systemic, oral	NA	mg/kg bw/da			

Part A and B. Spraying and Cleaning			
Long-term exposure, systemic/local, inhalative	0.0006	mg/m³	
Long-term exposure, systemic, dermal	4.96	mg/kg bw/d	

NA = Not applicable

Table 135: Estimated exposure for consumers / Contributing Scenario for PC4

Sub-Scenario/Use in Anti-freezing agents

Calculation tool used: ECETOC TRA (worker) v2.0 (see 1. General remarks)

Route of exposure	dose / conc	Unit	Justification
Long-term exposure, systemic/local, inhalative	4.97	mg/m³	
Long-term exposure, systemic, dermal	6.17	mg/kg bw/d	
Long-term exposure, systemic, oral	NA	mg/kg bw/d	See 1.21 General remarks

1.21.2.3. Indirect exposure of humans via the environment (oral)

The bioaccumulation potential of this substance is very low, with a Kow of 0.0339; therefore, indirect exposure of humans via the environment can be considered negligible.

1.21.2.4. Environmental exposure

The environmental exposure scenario is covered under the environmental assessment for Exposure Scenario 20 (Use in/as de-icing/anti-icing applications/agents (professional)) in Section 1.20.2.4.

1.22 Use in laboratories (industrial and professional)

1.22.1 Exposure Scenario 22

General Remarks

The relevant OCs used for calculation of environmental exposure are mentioned under paragraph 1.22.2.4.

Table 136: Description of ES 22

Reference Number	22	
1.22.1.1 Title		
Free short title	Use in laboratories (industrial and professional)	
Systematic title based on use descriptor	SU3 and 22; PROC 15; ERC 8a	
1.22.1.2 Operational conditions a	nd Risk management measures	
1.22.1.2.1Control of workers exposure for PROC 15		
Workers related free short title	Use as laboratory reagent	
Use descriptor covered	PROC 15	
Processes, tasks, activities covered Use of substances at small scale laboratory (< or 1 kg present at workplace). Larger laborat and R+D installations should be treated industrial processes.		tories
Assessment Method	ECETOC TRA Worker v2.0 with modifications ¹	
For further details on OCs and RMMs see Table 2		
The OCs and RMMs described apply for both industrial and professional use		

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

Use of tightly fitting safety goggles

(The substance has shown to cause mucosal irritations at relatively high concentrations. Thus, it is recommended to protect the eyes)

1.22.2 Exposure Estimation

1.22.2.1. Workers exposure

Table 137: Estimated exposure for workers – 15 (industrial and professional)PROC

Caluclation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Route of exposure	Concentrations		Justification
	Value	Unit	
Long-term exposure, systemic/local, inhalative	22.10	mg/m³	NA
Long-term exposure, systemic, dermal	0.34	mg/kg bw/d	NA

NA = Not applicable

1.22.2.2. Consumer exposure

Not applicable

1.22.2.3. Indirect exposure of humans via the environment (oral)

The bioaccumulation potential of this substance is very low, with a Kow of 0.0339; therefore, indirect exposure of humans via the environment can be considered negligible.

1.22.2.4. Environmental exposure

The environmental exposure scenario is evaluated below. Exposure has been estimated using the version of the ECETOC TRA Integrated Tool current at the time of preparation of this document.

Table 138: Environemntal Exposure Scenario ES22-E1

Section 1	Operational conditions and risk management measures	
Section 1.2	Control of environmental exposure	
Identifier*	ES22-E1	
Contributing scenario	Use In Laboratories	
Environmental Release Category	ERC8a	
Specific ERC		
Assessment scenario		
Operational Conditions		
Amounts used		
Amounts used in the EU (tonnes/year)	200,000	
	(total industry tonnage for use in production of	
	polymers)	
Fraction of EU tonnage used in region	0.1	
Fraction of main source to local	1 0.002	
environment		
Fraction of substance in end-use products	1	
Maximum daily site tonnage (kg/day)	1,096	
Frequency and duration of use		
Type of release	Continuous	
Emission days (days/year)	365 – ERC8a	
Site specific monitoring data results for		
surface water effluent		
Location of sample		
Environmental factors not influenced by		
risk management		
Local freshwater dilution factor	10 (default)	
Local marine water dilution factor	100 (default)	
Other given operational conditions affecting environmental exposure		

Risk Management Measures	
Technical conditions and measures at	
process level (source) to prevent release	
process lever (source) to prevent release	
Technical onsite conditions and	
measures to reduce or limit discharges, air emissions and releases to soil	
an emissions and releases to son	
Treat air emissions to provide a typical	
removal efficiency of (%)	070/
Treat wastewater (prior to discharge to	87%
receiving water) to provide the required	
removal efficiency of (%) ETotal,RMM = 1 – ((1 – ERMM, 1) x (1 – ERMM,2))	
Organizational measures to	
prevent/limit release from site	
Conditions and measures related to	
municipal sewage treatment plant	
Conditions and measures related to	
external treatment of waste for disposal	
Conditions and measures related to	
external recovery of waste	
•	
Other environmental control measures	
Other environmental control measures additional to above	ES22-E1
Other environmental control measures additional to above Identifier	ES22-E1 Release fraction derived from ERC (8a)
Other environmental control measures additional to above Identifier Narrative	ES22-E1 Release fraction derived from ERC (8a) 1.00E+00
Other environmental control measures additional to above Identifier Narrative Release fraction to air from process	Release fraction derived from ERC (8a) 1.00E+00
Other environmental control measures additional to above Identifier Narrative Release fraction to air from process	Release fraction derived from ERC (8a)
Other environmental control measures additional to above Identifier Narrative Release fraction to air from process Release fraction to wastewater from process	Release fraction derived from ERC (8a) 1.00E+00
Other environmental control measures additional to above Identifier Narrative Release fraction to air from process Release fraction to wastewater from process Release fraction to soil from process	Release fraction derived from ERC (8a) 1.00E+00 1.00E+00
Other environmental control measures additional to above Identifier Narrative Release fraction to air from process Release fraction to wastewater from process	Release fraction derived from ERC (8a) 1.00E+00 1.00E+00
Other environmental control measures additional to above Identifier Narrative Release fraction to air from process Release fraction to wastewater from process Release fraction to soil from process (regional only) Local release to air (kg/d)	Release fraction derived from ERC (8a) 1.00E+00 1.00E+00 0.00E+00
Other environmental control measures additional to above Identifier Narrative Release fraction to air from process Release fraction to wastewater from process Release fraction to soil from process (regional only) Local release to air (kg/d) Local release to sewage (kg/d)	Release fraction derived from ERC (8a) 1.00E+00 1.00E+00 0.00E+00 1.10E+02
Other environmental control measures additional to above Identifier Narrative Release fraction to air from process Release fraction to wastewater from process Release fraction to soil from process (regional only) Local release to air (kg/d)	Release fraction derived from ERC (8a) 1.00E+00 1.00E+00 0.00E+00 1.10E+02 1.10E+02
Other environmental control measures additional to above Identifier Narrative Release fraction to air from process Release fraction to wastewater from process Release fraction to soil from process (regional only) Local release to air (kg/d) Local release to sewage (kg/d) Local release to soil (kg/d)	Release fraction derived from ERC (8a) 1.00E+00 1.00E+00 0.00E+00 1.10E+02 1.10E+02
Other environmental control measures additional to above Identifier Narrative Release fraction to air from process Release fraction to wastewater from process Release fraction to soil from process (regional only) Local release to air (kg/d) Local release to sewage (kg/d) Local release to soil (kg/d) Total efficiency of removal from	Release fraction derived from ERC (8a) 1.00E+00 1.00E+00 0.00E+00 1.10E+02 1.10E+02
Other environmental control measures additional to above Identifier Narrative Release fraction to air from process Release fraction to wastewater from process Release fraction to soil from process (regional only) Local release to air (kg/d) Local release to sewage (kg/d) Total efficiency of removal from wastewater after onsite and offsite	Release fraction derived from ERC (8a) 1.00E+00 1.00E+00 0.00E+00 1.10E+02 1.10E+02
Other environmental control measures additional to above Identifier Narrative Release fraction to air from process Release fraction to wastewater from process Release fraction to soil from process (regional only) Local release to air (kg/d) Local release to sewage (kg/d) Local release to soil (kg/d) Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	Release fraction derived from ERC (8a) 1.00E+00 1.00E+00 0.00E+00 1.10E+02 1.10E+02
Other environmental control measures additional to above Identifier Narrative Release fraction to air from process Release fraction to wastewater from process Release fraction to soil from process (regional only) Local release to air (kg/d) Local release to sewage (kg/d) Local release to soil (kg/d) Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%) Total efficiency of removal from air	Release fraction derived from ERC (8a) 1.00E+00 1.00E+00 0.00E+00 1.10E+02 1.10E+02
Other environmental control measures additional to above Identifier Narrative Release fraction to air from process Release fraction to wastewater from process Release fraction to soil from process (regional only) Local release to air (kg/d) Local release to sewage (kg/d) Local release to soil (kg/d) Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%) Total efficiency of removal from air emissions (%)	Release fraction derived from ERC (8a) 1.00E+00 1.00E+00 0.00E+00 1.10E+02 1.10E+02 0.00E+00

1.22.2.4.1 Predicted exposure concentrations in the STP and in the aquatic compartments (freshwater, seawater and sediments)

Table 139: Predicted exposure concentrations in the STP and in the aquatic compartments (freshwater, seawater and sediments)

Local Concentration, Compartment: STP		
and aquatic	unit	ES22-E1
Local PEC in surface water during emission	mg/L	8.202E-01
episode (dissolved)		
Annual average local PEC in surface water	mg/L	8.202E-01
(dissolved)		
Local PEC in fresh water sediment during	mg/kg	3.100E+00
emission episode	dwt	
Local PEC in sea water during emission	mg/L	8.191E-02
episode		
Annual average local PEC in sea water	mg/L	8.191E-02
(dissolved)		
Local PEC in marine sediment during	mg/kg	3.096E-01
emission episode	dwt	
PEC for microorganisms in STP	mg/L	6.935E+00
Comments		

1.22.2.4.2 Predicted exposure concentration in soils

Table 140: Predicted exposure concentration in soils

Local Concentration, Compartment: soil	unit	ES22-E1
Local PEC in agricultural soil, averaged over	mg/kg	1.877E-01
30 days	dwt	
Local PEC agricultural soil, averaged over	mg/kg	1.693E-01
180 days	dwt	
Local PEC in grass land, averaged over 180	mg.kg	1.647E-01
days	dwt	
Comments		

1.22.2.4.3 Predicted exposure concentration in the atmospheric compartment

Table 141: Predicted exposure concentration in the atmospheris compartment

Local	Concentration,		
Compartment:	air	unit	ES22-E1
Annual average (total)	e local PEC in air	kg/m ³	1.081E-10
Comments			

1.22.2.4.4 Predicted exposure concentration in food for secondary poisoning

The bioaccumulation potential of this substance is very low, therefore secondary poisoning can be considered negligible. The Kow for DEG is 0.0339.

1.23 Use in Adhesives and Sealants (Consumer use) General remarks

In order to assess products included in PC1, the use of a carpet glue has been chosen as representative worst case scenario

1.23.1 Exposure Scenario 23

General Remarks

The relevant OCs used for calculation of environmental exposure are mentioned under paragraph 1.23.2.4.

Table 142: Description of the ES 23

Reference Number	23	
1.23.1.1. Title		
Free short title	Use in Adhesives and Sealants (Consumer use)	
Systematic title based on use descriptor	SU21; PC 1; ERC 8c	
1.23.1.2. Operational conditions	and ri	sk management measures
1.23.1.2.1 Control of consumer e	xposui	re for PC 1
Name of contributing scenario Use in Adhesives and Sealants		Use in Adhesives and Sealants
Use descriptor covered		PC 1
Processes, tasks, activities covered		see above (General Remarks);
		see corresponding Fact Sheet ¹
		ConsExpo 4.1
Assessment Method		Based on the ConsExpo default database for Do it yourself products/Glues/Carpet glue
Part A. Mixing and Loading		
Product characteristic		

Physical state	Liquid	
Concentration of substance	max 0.075%	
Vapour pressure of the substance	0.008 hPa	
Mol weight matrix of the product	3000 g/mol	(Default value)
Mass transfer rate	3660 m/min	Langmuirs method (as stated in the corresponding Fact Sheet)
Amounts used		
Applied amount	9000 g/day	(Default value – refers to half of the bottle content) See footnote 2
Frequency and duration of use/expo	osure	
Duration of exposure	75 min	(Default value)
Duration of application	75 min	(Default value)
Frequency of exposure	0.25 days/year	(Default value – not relevant for the calculation of the mean concentration on day of exposure)
Human factors not influenced by ri	sk management	
Exposed skin surface	50% of one hand palm (110 cm ²)	(Default value)
Type of activity (inhalation rate)	Light activity	See footnote 2
Other given operational conditions	affecting consumers expo	osure
Location	Inside	
Room volume	58 m³	(Default value)
Ventilation rate	0.5 per hour	(Default value)
Release area	4 m ²	(Default value)
Contact rate	30 mg/min	(Default value)
Release duration	4500 s	(Default value)
Application temperature	25°C	
Conditions and measures related to	information and behavio	oural advice to consumers
Not applicable		
Conditions and measures related to	personal protection and	hygiene
Not applicable		

1.23.2 Exposure Estimation

1.23.2.1. Workers exposure

Not applicable.

1.23.2.2. Consumer exposure

Table 143: Estimated exposure for consumers / Contributing Scenario for PC 1

Calculation tool used: ConsExpo 4.1

Route of exposure	dose / conc	Unit	Justification
Long-term exposure, systemic/local, inhalative	0.31	mg/m³	
Long-term exposure, systemic, dermal	0.26	mg/kg bw/d	
Long-term exposure, systemic, oral	NA	mg/kg bw/d	

1.23.2.3. Indirect exposure of humans via the environment (oral)

The bioaccumulation potential of this substance is very low, with a Kow of 0.0339; therefore, indirect exposure of humans via the environment can be considered negligible.

1.23.2.4. Environmental exposure

The environmental exposure scenario is evaluated below. Exposure has been estimated using the version of the ECETOC TRA Integrated Tool current at the time of preparation of this document

Table 144: Environmental Exposure Scenario ES23-E1

Section 1	Operational conditions and risk management measures
Section 1.2	Control of environmental exposure
Identifier*	ES23-E1
Contributing scenario	Use In Adhesives
Environmental Release Category	ERC8c
Specific ERC	
Assessment scenario	
Operational Conditions	
Amounts used	
Amounts used in the EU (tonnes/year)	200,000
	(total industry tonnage for use in production of
	polymers)
Fraction of EU tonnage used in region	0.1
Fraction of main source to local environment	0.002

	1.
Fraction of substance in end-use products	1
Maximum daily site tonnage (kg/day)	1,096
Frequency and duration of use	
Type of release	Continuous
Emission days (days/year)	365 - ERC8c
Site specific monitoring data results for	
surface water effluent	
Location of sample	
Environmental factors not influenced by	
risk management	
Local freshwater dilution factor	10 (default)
	10 (default)
Local marine water dilution factor	100 (default)
Other given operational conditions	
affecting environmental exposure	
Risk Management Measures	
Technical conditions and measures at	
process level (source) to prevent release	
Technical onsite conditions and	
measures to reduce or limit discharges,	
air emissions and releases to soil	
Treat air emissions to provide a typical	
removal efficiency of (%)	
Treat wastewater (prior to discharge to	87%
receiving water) to provide the required	8770
removal efficiency of (%) ETotal,RMM =	
$1 - ((1 - \text{ERMM}, 1) \times (1 - \text{ERMM}, 2))$	
Organizational measures to prevent/limit release from site	
Conditions and measures related to municipal sewage treatment plant	
Conditions and measures related to	
external treatment of waste for disposal	
Conditions and measures related to	
external recovery of waste	
Other environmental control measures	
additional to above	
Identifier	ES23-E1
Narrative	Release fraction derived from ERC (8c)
Release fraction to air from process	1.50E-01
Release fraction to wastewater from	1.00E-02
process	
Release fraction to soil from process (regional only)	0.00E+00
	1.640.01
Local release to air (kg/d)	1.64E+01

Local release to sewage (kg/d)	1.10E+00
Local release to soil (kg/d)	0.00E+00
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	
Total efficiency of removal from air emissions (%)	
The maximum allowable site tonnage (M_{Safe}) based on removal from domestic sewage treatment (kg/d)	68,027

1.23.2.4.1 Predicted exposure concentrations in the STP and in the aquatic compartments (freshwater, seawater and sediments)

Table 145: Predicted exposure concentrations in the STP and in the aquatic compartments (freshwater, seawater and sediments)

Local Concentration, Compartment: STP		
and aquatic	unit	ES23-E1
Local PEC in surface water during emission	mg/L	1.652E-02
episode (dissolved)		
Annual average local PEC in surface water	mg/L	1.652E-02
(dissolved)		
Local PEC in fresh water sediment during	mg/kg	6.245E-02
emission episode	dwt	
Local PEC in sea water during emission		1.677E-03
episode		
Annual average local PEC in sea water	mg/L	1.677E-03
(dissolved)		
Local PEC in marine sediment during	mg/kg	6.340E-03
emission episode	dwt	
PEC for microorganisms in STP	mg/L	6.935E-02
Comments		

1.23.2.4.2 Predicted exposure concentration in soils

Table 146: Predicted exposure concentration in soils

Local Concentration, Compartment: soil	unit	ES23-E1
Local PEC in agricultural soil, averaged over 30 days	mg/kg dwt	2.465E-02
Local PEC agricultural soil, averaged over 180 days	mg/kg dwt	2.446E-02
Local PEC in grass land, averaged over 180 days	mg.kg dwt	2.442E-02
Comments		

1.23.2.4.3 Predicted exposure concentration in the atmospheric compartment

Table 147: Predicted exposure concentration in the atmospheric compartment

Local	Concentration,		
Compartment: a	ir	unit	ES23-E1
Annual average (total)	local PEC in air	kg/m ³	1.621E-11
Comments			

1.23.2.4.4 Predicted exposure concentration in food for secondary poisoning

The bioaccumulation potential of this substance is very low, therefore secondary poisoning can be considered negligible. The Kow for DEG is 0.0339.

1.24 Production of Polymers, filled polymers, Foams, Coatings, Adhesives, Sealants

1.24.1 Exposure Scenario 24

General Remarks

The relevant OCs used for calculation of environmental exposure are mentioned under paragraph 1.24.2.4.

Table 140. Describition of ES 4.	Table	le 148:	Description	n of ES 25
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Reference Number	24	
1.24.1.1 Title		
Free short title	Production of Polymers, filled polymers, foams, coatings, adhesives, sealants	
Systematic title based on use descriptor	SU3; PROC 1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 13, 14, and 15; ERC 6c	
1.24.1.2 Operational conditions a	and Risk management measures	
1.24.1.2.1 Control of workers exp	posure for PROC 1	
Workers related free short title	Use in closed process, no likelihood of exposure	
Use descriptor covered	PROC 1	
Processes, tasks, activities covere	Use of the substance in high integrity contained system where little potential exists for exposures, e.g. any sampling via closed loop systems	
Aggaggment Mathad	ECETOC TRA Worker v2.0 with modifications	
Assessment Method	(see 1. General remarks)	
For further details on OCs and RMMs see Table 14		
1.24.1.2.2 Control of workers exposure for PROC 2		
Workers related free short title Use in closed, continuous process with occasion controlled exposure		
Use descriptor covered	PROC 2	
Processes, tasks, activities covere	Continuous process but where the design philosophy is not specifically aimed at minimizing emissions. Occasional exposure will arise e.g. through maintenance, sampling and equipment breakages	
Assessment Method	ECETOC TRA Worker v2.0 with modifications	
1 x55C55IIICIII IVICUIUU	(see 1. General remarks)	
For further details on OCs and RMMs see Table 14		
1.24.1.2.3 Control of workers exposure for PROC 3 and 4		
Workers related free short title	Use in closed batch process (synthesis or formulation).	

Use in batch and other process (synthesis) where opportunity for exposure arises. Use descriptor covered PROC 3 and 4 Batch manufacture of a chemical or formulation where the predominant handling is in a contained manner, e.g. through enclosed transfers, but where some opportunity for contact with chemicals occurs, e.g. through sampling Use in batch manufacture of a chemical where significant opportunity for exposure arises, e.g. during charging, sampling or discharge of material, and when the nature of the design is likely to result in exposure. ECETOC TRA Worker v2.0 with modifications (see 1. General remarks) For further details on OCs and RMMs see Table 2 1.24.1.2.4 Control of workers exposure for PROC 5 Workers related free short title Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact). Use descriptor covered PROC 5 Manufacture or formulation of chemical products or articles using technologies related to mixing and blending of solid or liquid materials, and where the process is in stages and provides the opportunity for significant contact at any stage		
Batch manufacture of a chemical or formulation where the predominant handling is in a contained manner, e.g. through enclosed transfers, but where some opportunity for contact with chemicals occurs, e.g. through sampling Use in batch manufacture of a chemical where significant opportunity for exposure arises, e.g. during charging, sampling or discharge of material, and when the nature of the design is likely to result in exposure. Assessment Method ECETOC TRA Worker v2.0 with modifications (see 1. General remarks) For further details on OCs and RMMs see Table 2 1.24.1.2.4 Control of workers exposure for PROC 5 Workers related free short title Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact). Use descriptor covered PROC 5 Manufacture or formulation of chemical products or articles using technologies related to mixing and blending of solid or liquid materials, and where the process is in stages and provides the opportunity		
where the predominant handling is in a contained manner, e.g. through enclosed transfers, but where some opportunity for contact with chemicals occurs, e.g. through sampling Use in batch manufacture of a chemical where significant opportunity for exposure arises, e.g. during charging, sampling or discharge of material, and when the nature of the design is likely to result in exposure. Assessment Method ECETOC TRA Worker v2.0 with modifications (see 1. General remarks) For further details on OCs and RMMs see Table 2 1.24.1.2.4 Control of workers exposure for PROC 5 Workers related free short title Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact). Use descriptor covered PROC 5 Manufacture or formulation of chemical products or articles using technologies related to mixing and blending of solid or liquid materials, and where the process is in stages and provides the opportunity		
Use in batch manufacture of a chemical where significant opportunity for exposure arises, e.g. during charging, sampling or discharge of material, and when the nature of the design is likely to result in exposure. ECETOC TRA Worker v2.0 with modifications (see 1. General remarks) For further details on OCs and RMMs see Table 2 1.24.1.2.4 Control of workers exposure for PROC 5 Workers related free short title Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact). Use descriptor covered PROC 5 Manufacture or formulation of chemical products or articles using technologies related to mixing and blending of solid or liquid materials, and where the process is in stages and provides the opportunity		
For further details on OCs and RMMs see Table 2 1.24.1.2.4 Control of workers exposure for PROC 5 Workers related free short title Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact). Use descriptor covered PROC 5 Manufacture or formulation of chemical products or articles using technologies related to mixing and blending of solid or liquid materials, and where the process is in stages and provides the opportunity		
For further details on OCs and RMMs see Table 2 1.24.1.2.4 Control of workers exposure for PROC 5 Workers related free short title Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact). Use descriptor covered PROC 5 Manufacture or formulation of chemical products or articles using technologies related to mixing and blending of solid or liquid materials, and where the process is in stages and provides the opportunity		
1.24.1.2.4 Control of workers exposure for PROC 5 Workers related free short title Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact). Use descriptor covered PROC 5 Manufacture or formulation of chemical products or articles using technologies related to mixing and blending of solid or liquid materials, and where the process is in stages and provides the opportunity		
Workers related free short title Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact). Use descriptor covered PROC 5 Manufacture or formulation of chemical products or articles using technologies related to mixing and blending of solid or liquid materials, and where the process is in stages and provides the opportunity		
Workers related free short title formulation of preparations and articles (multistage and/or significant contact). Use descriptor covered PROC 5 Manufacture or formulation of chemical products or articles using technologies related to mixing and blending of solid or liquid materials, and where the process is in stages and provides the opportunity		
Manufacture or formulation of chemical products or articles using technologies related to mixing and blending of solid or liquid materials, and where the process is in stages and provides the opportunity		
Processes, tasks, activities covered or articles using technologies related to mixing and blending of solid or liquid materials, and where the process is in stages and provides the opportunity		
ECETOC TRA Worker v2.0 with modifications		
Assessment Method (see 1. General remarks)		
For further details on OCs and RMMs see Table 14		
1.24.1.2.5 Control of workers exposure for PROC 7		
Workers related free short title Industrial spraying		
Use descriptor covered PROC 7		
Air dispersive techniques		
Spraying for surface coating, adhesives, polishes/cleaners, air care products, sandblasting		
Processes, tasks, activities covered Substances can be inhaled as aerosols. The energy of the aerosol particles may require advanced exposure controls; in case of coating, overspray may lead to waste water and waste.		
Assessment Method Stoffenmanager v4.0		
For futher details on OCs and RMMs see Table 46		
1.24.1.2.6 Control of workers exposure for PROC 8a		

	T		
Workers related free short title	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities.		
Use descriptor covered	PROC 8a		
Processes, tasks, activities covered	Sampling, loading, filling, transfer, dumping, bagging in non- dedicated facilities. Exposure related to dust, vapour, aerosols or spillage, and cleaning of equipment to be expected.		
Assessment Method	ECETOC TRA Worker v2.0 with modifications		
Assessment Method	(see 1. General remarks)		
For further details on OCs and RMM	Is see Table 2		
1.24.1.2.7 Control of workers exposure for PROC 8b and 9			
Workers related free short title	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities.		
Use descriptor covered	PROC 8b and 9		
Processes, tasks, activities covered	Sampling, loading, filling, transfer, dumping, bagging in dedicated facilities. Exposure related to dust, vapour, aerosols or spillage, and cleaning of equipment to be expected.		
A seessam and Modhad	ECETOC TRA Worker v2.0 with modifications		
Assessment Method	(see 1. General remarks)		
For further details on OCs and RMMs see Table 2			
1.24.1.2.8 Control of workers exposure for PROC 10			
Workers related free short title	Roller application or brushing		
Use descriptor covered	PROC 10		
	Low energy spreading of e.g. coatings		
Processes, tasks, activities covered	Including cleaning of surfaces. Substance can be inhaled as vapours, skin contact can occur through droplets, splashes, working with wipes and handling of treated surfaces.		
Assessment Method	ECETOC TRA Worker v2.0 with modifications		
Assessment Method	(see 1. General remarks)		
For futher details on OCs and RMMs	s see Table 46		
1.24.1.2.9 Control of workers exposure for PROC 13			
Workers related free short title	Treatment of articles by dipping and pouring.		
Use descriptor covered	PROC 13		
Processes, tasks, activities covered	Immersion operations. Treatment of articles by dipping, pouring, immersing, soaking, washing out or washing in substances; including cold formation or resin type matrix. Includes handling of treated objects (e.g. after dying, plating). Substance is		

	applied to a surface by low energy techniques such as dipping the article into a bath or pouring a preparation onto a surface.		
	ECETOC TRA Worker v2.0 with modifications		
Assessment Method	(see 1. General remarks)		
For further details on OCs and RMM	1s see Table 23		
1.24.1.2.10 Control of workers exposure for PROC 14			
Workers related free short title	Production of preparations or articles by tabletting compression, extrusion, pelletisation.		
Use descriptor covered	PROC 14		
Processes, tasks, activities covered	Processing of preparations and/or substance (liquid and solid) into preparations or articles Substances in the chemical matrix may be expose to elevated mechanical and/or thermal energy conditions. Exposure is predominantly related to volatiles and/or generated fumes, dust may be formed as well.		
Assessment Method	ECETOC TRA Worker v2.0 with modifications (see 1. General remarks)		
Product characteristic (see 1. General remarks)			
1.24.1.2.11 Control of workers exposure for PROC 15			
Workers related free short title	Use as laboratory reagent		
Use descriptor covered	PROC 15		
Processes, tasks, activities covered	Use of substances at small scale laboratory (< 1 l or 1 kg present at workplace). Larger laboratories and R+D installations should be treated as industrial processes.		
Assessment Method	ECETOC TRA Worker v2.0 with modifications		
Assessment Methou	(see 1. General remarks)		
For further details on OCs and RMMs see Table 2			

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

Use of tightly fitting safety goggles

(The substance has shown to cause mucosal irritations at relatively high concentrations. Thus, it is recommended to protect the eyes)

1.24.2 Exposure Estimation

1.24.2.1. Workers exposure

For the estimated exposure for workers / PROC 1 see Table 15
For the estimated exposure for workers / PROC 2 see Table 16
For the estimated exposure for workers / PROC 3 see Table 5
For the estimated exposure for workers / PROC 4 see Table 6
For the estimated exposure for workers / PROC 5 see Table 17
For the estimated exposure for workers / PROC 7 see Table 47
For the estimated exposure for workers / PROC 8a see Table 7
For the estimated exposure for workers / PROC 8b see Table 8
For the estimated exposure for workers / PROC 9 see Table 18
For the estimated exposure for workers / PROC 10 see Table 48
For the estimated exposure for workers / PROC 13 see Table 24
For the estimated exposure for workers / PROC 14 see Table 25
For the estimated exposure for workers / PROC 15 see Table 9

1.24.2.2. Consumer exposure

Not applicable

1.24.2.3. Indirect exposure of humans via the environment (oral)

The bioaccumulation potential of this substance is very low, with a Kow of 0.0339; therefore, indirect exposure of humans via the environment can be considered negligible.

1.24.2.4. Environmental exposure

Table 149: Environmental Exposure Scenario ES24-E1

Section 1	Operational conditions and risk management measures		
Section 1.2	Control of environmental exposure		
Identifier*	ES24-E1		
Contributing scenario	Production Of Polymers		
Environmental Release Category	ERC6c		
Specific ERC	ESVOC 43		
Assessment scenario			
Operational Conditions			
Amounts used			
Amounts used in the EU (tonnes/year)	200,000 (total industry tonnage for use in production of polymers)		
Fraction of EU tonnage used in region	1		
Fraction of main source to local environment	0.075		
Fraction of substance in end-use products	1		
Maximum daily site tonnage (kg/day)	50,000		

Frequency and duration of use	
Type of release	Continuous
Emission days (days/year)	300 - ESVOC 43
Site specific monitoring data results for	
surface water effluent	
Location of sample	
Environmental factors not influenced by	
risk management	
Local freshwater dilution factor	10 (default)
Local marine water dilution factor	100 (default)
Other given operational conditions	
affecting environmental exposure	
Risk Management Measures	
Technical conditions and measures at	
process level (source) to prevent release	
Technical onsite conditions and	
measures to reduce or limit discharges,	
air emissions and releases to soil	
Treat air emissions to provide a typical	
removal efficiency of (%)	
Treat wastewater (prior to discharge to	87%
receiving water) to provide the required	
removal efficiency of (%) ETotal,RMM =	
$1 - ((1 - \text{ERMM}, 1) \times (1 - \text{ERMM}, 2))$	
Organizational measures to prevent/limit release from site	
Conditions and measures related to	
municipal sewage treatment plant	
Conditions and measures related to	
external treatment of waste for disposal	
Conditions and measures related to	
external recovery of waste	
Other environmental control measures	
additional to above	
Identifier	ES24-E1
Narrative	Release fraction derived from SpERC (ESVOC 43)
Release fraction to air from process	2.00E-03
Release fraction to wastewater from	1.00E-02
process	
Release fraction to soil from process	1.00E-04
(regional only)	1,007,02
Local release to air (kg/d) Local release to sewage (kg/d)	1.00E+02 5.00E+02
	L & DOLD LOG

Local release to soil (kg/d)	5.00E+00
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	
Total efficiency of removal from air emissions (%)	
The maximum allowable site tonnage (M_{Safe}) based on removal from domestic sewage treatment (kg/d)	87,155
Scaling	

The downstream user can check the compliance of his site by comparing site specific data with defaults used in the exposure assessment. The site specific quotient should be inferior or equal to the spERC quotient.

$$\frac{m_{\text{spERC}}^{*}(1-E_{\text{ER,spERC}})*F_{\text{releasespERC}}}{DF_{\text{spERC}}} \ge \frac{m_{\text{site}}*(1-E_{\text{ER,site}})*F_{\text{releasesite}}}{DF_{\text{site}}}$$

 m_{spERC} : Substance use rate in spERC $E_{ER,spERC}$: Efficacy of RMM in spERC $F_{release,,spERC}$: Initial release fraction in

spERC

DF_{spERC}: dilution factor of STP effluent in

river

 m_{site} : Substance use rate at site $E_{ER,site}$: Efficacy of RMM at site

 $F_{release,,site}$: Initial release fraction at site DF_{site} : dilution factor of STP effluent in

river

1.24.2.4.1 Predicted exposure concentrations in the STP and in the aquatic compartments (freshwater, seawater and sediments)

Table 150: Predicted exposure concnetrations in the STP and in the aquatic

compartments (freshwater, seawater and sediments)

La Comparements (ireshwater, seawater and seamients)			
Local Concentration, Compartment: STP			
and aquatic	unit	ES24-E1	
Local PEC in surface water during emission	mg/L	3.172E+00	
episode (dissolved)			
Annual average local PEC in surface water	mg/L	2.608E+00	
(dissolved)			
Local PEC in fresh water sediment during	mg/kg	1.199E+01	
emission episode	dwt		
Local PEC in sea water during emission	mg/L	3.172E-01	
episode			
Annual average local PEC in sea water	mg/L	2.608E-01	
(dissolved)			
Local PEC in marine sediment during	mg/kg	1.199E+00	
emission episode	dwt		
PEC for microorganisms in STP	mg/L	3.164E+01	
Comments			

1.24.2.4.2 Predicted exposure concentration in soils

Table 151: Predicted exposure concentration in soils

Local Concentration, Compartment: soil	unit	ES24-E1
Local PEC in agricultural soil, averaged over 30 days	mg/kg dwt	1.216E-01
Local PEC agricultural soil, averaged over 180 days	mg/kg dwt	3.772E-02
Local PEC in grass land, averaged over 180 days	mg.kg dwt	1.907E-02
Comments		

1.24.2.4.3 Predicted exposure concentration in the atmospheric compartment

Table 152: Predicted exposure concentration in the atmopsheric compartment

Local	Concentration,		
Compartment:	air	unit	ES24-E1
Annual average (total)	e local PEC in air	kg/m ³	2.285E-08
Comments			

1.24.2.4.4 Predicted exposure concentration in food for secondary poisoning The bioaccumulation potential of this substance is very low, therefore secondary poisoning can be considered negligible. The Kow for DEG is 0.0339.

1.25 Production of rigid foam (Consumer use)

1.25.1 Exposure Scenario 25

General Remarks

The relevant OCs used for calculation of environmental exposure are mentioned under paragraph 1.25.2.4.

Table 153: Description of the ES 25

	Table 153: Description of the ES 25			
Reference Number	25			
1.25.1.1. Title				
Free short title	Proc	luction of rigid foam (Co	onsumer use)	
Systematic title based on use descriptor	SU2	1; PC 32; ERC 8f		
1.25.1.2. Operational conditions	and 1	risk management meas	ures	
1.25.1.2.1 Control of consumer exposure for PC32				
Name of contributing scenario		Production of rigid foam (Consumer use)		
Use descriptor covered		PC32		
Processes, tasks, activities covered	ed	see above (General Re	marks);	
		ConsExpo 4.1		
Assessment Method		Based on the ConsExpo default database for Do it yourself products/Miscelleaneous do it yourself products/insulation foam/Application		
Product characteristic				
Physical state		Liquid		
Concentration of substance Max.		Max. 5 %		
Vapour pressure of the substance 0.123 hPa				
Amounts used				
Applied amount	925 a	Default value		
Applied amount		825 g	See footnote 1	
Frequency and duration of use/e	xposi	ure		
Duration of exposure		30 min	Default value	
Exposure frequency		0.2 1/year	(Default value – not relevant for the calculation of the mean concentration on day of exposure)	
Human factors not influenced by risk management				
Type of activity (inhalation rate)		Light activity	See footnote 3	
Eposed skin surface		1900 cm ²	Default value	
Other given operational conditions affecting consumers exposure				

Location	Inside		
Application temperature	25°C		
Inhalation rate	1.5 1/hr	Default value	
Room volume	57.5 m³	Default value	
Conditions and measures related to information and behavioural advice to consumers			
Not applicable			
Conditions and measures related to personal protection and hygiene			
Not applicable			

1.25.2 Exposure Estimation

1.25.2.1. Workers exposure

Not applicable

1.25.2.2. Consumer exposure

Table 154: Estimated exposure for consumers / Contributing Scenario for PC32

Calculation tool used: ECETOC TRA (worker) v2.0 (see 1. General remarks)

Route of exposure	dose / conc	Unit	Justification
Long-term exposure, systemic/local, inhalative	0.07	mg/m³	
Long-term exposure, systemic, dermal	0.19	mg/kg bw/d	
Long-term exposure, systemic, oral	NA	mg/kg bw/d	

1.25.2.3. Indirect exposure of humans via the environment (oral)

The bioaccumulation potential of this substance is very low, with a Kow of 0.0339; therefore, indirect exposure of humans via the environment can be considered negligible.

1.25.2.4. Environmental exposure

The environmental exposure scenario is evaluated below. Exposure has been estimated using the version of the ECETOC TRA Integrated Tool current at the time of preparation of this document.

Table 155: Environmental Exposure Scenario ES25-E1

Section 1	Operational conditions and risk management measures
Section 1.2	Control of environmental exposure
Identifier*	ES25-E1
Contributing scenario	Production Of Rigid Foam
Environmental Release Category	ERC8f
Specific ERC	
Assessment scenario	
Operational Conditions	
Amounts used	
Amounts used in the EU (tonnes/year)	200,000 (total industry tonnage for use in production of polymers)
Fraction of EU tonnage used in region	0.1
Fraction of main source to local	0.002

. ,	
environment	
Fraction of substance in end-use products	1
Maximum daily site tonnage (kg/day)	1,096
Frequency and duration of use	
Type of release	Continuous
Emission days (days/year)	365 - ERC8f
Site specific monitoring data results for	
surface water effluent	
Location of sample	
Environmental factors not influenced by	
risk management	
Local freshwater dilution factor	10 (default)
Local marine water dilution factor	100 (default)
	100 (uciauit)
Other given operational conditions	
affecting environmental exposure	
Risk Management Measures	
Technical conditions and measures at	
process level (source) to prevent release	
Technical onsite conditions and	
measures to reduce or limit discharges,	
air emissions and releases to soil	
Treat air emissions to provide a typical	
removal efficiency of (%)	
Treat wastewater (prior to discharge to	87%
receiving water) to provide the required	
removal efficiency of (%) ETotal,RMM =	
$1 - ((1 - ERMM, 1) \times (1 - ERMM, 2))$	
Organizational measures to	
prevent/limit release from site	
Conditions and measures related to	
municipal sewage treatment plant	
Conditions and measures related to	
external treatment of waste for disposal	
external treatment of waste for disposal Conditions and measures related to	
external treatment of waste for disposal Conditions and measures related to external recovery of waste	
external treatment of waste for disposal Conditions and measures related to external recovery of waste Other environmental control measures	
external treatment of waste for disposal Conditions and measures related to external recovery of waste Other environmental control measures additional to above	
external treatment of waste for disposal Conditions and measures related to external recovery of waste Other environmental control measures additional to above Identifier	ES25-E1
external treatment of waste for disposal Conditions and measures related to external recovery of waste Other environmental control measures additional to above Identifier Narrative	Release fraction derived from ERC (8f)
external treatment of waste for disposal Conditions and measures related to external recovery of waste Other environmental control measures additional to above Identifier Narrative Release fraction to air from process	Release fraction derived from ERC (8f) 1.50E-01
external treatment of waste for disposal Conditions and measures related to external recovery of waste Other environmental control measures additional to above Identifier Narrative	Release fraction derived from ERC (8f)
external treatment of waste for disposal Conditions and measures related to external recovery of waste Other environmental control measures additional to above Identifier Narrative Release fraction to air from process	Release fraction derived from ERC (8f) 1.50E-01
external treatment of waste for disposal Conditions and measures related to external recovery of waste Other environmental control measures additional to above Identifier Narrative Release fraction to air from process Release fraction to wastewater from	Release fraction derived from ERC (8f) 1.50E-01
Conditions and measures related to external recovery of waste Other environmental control measures additional to above Identifier Narrative Release fraction to air from process Release fraction to wastewater from process	Release fraction derived from ERC (8f) 1.50E-01 1.00E-02

Local release to air (kg/d)	1.64E+01
Local release to sewage (kg/d)	1.10E+00
Local release to soil (kg/d)	5.48E-01
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	
Total efficiency of removal from air emissions (%)	
The maximum allowable site tonnage (M_{Safe}) based on removal from domestic sewage treatment (kg/d)	68,011

1.25.2.4.1 Predicted exposure concentrations in the STP and in the aquatic compartments (freshwater, seawater and sediments)

Table 156: Predicted exposure concentrations in the STP and in the aquatic compartments (freshwater, seawater and sediments)

Local Concentration, Compartment: STP		
and aquatic	unit	ES25-E1
Local PEC in surface water during emission	mg/L	1.677E-02
episode (dissolved)		
Annual average local PEC in surface water	mg/L	1.677E-02
(dissolved)		
Local PEC in fresh water sediment during	mg/kg	6.338E-02
emission episode	dwt	
Local PEC in sea water during emission	mg/L	1.701E-03
episode		
Annual average local PEC in sea water	mg/L	1.701E-03
(dissolved)		
Local PEC in marine sediment during	mg/kg	6.428E-03
emission episode	dwt	
PEC for microorganisms in STP	mg/L	6.935E-02
Comments		

1.25.2.4.2 Predicted exposure concentration in soils

Table 157: Predicted exposure concentration in soils

Local Concentration, Compartment: soil	unit	ES25-E1
Local PEC in agricultural soil, averaged over 30 days	mg/kg dwt	2.465E-02
Local PEC agricultural soil, averaged over 180 days	mg/kg dwt	2.447E-02
Local PEC in grass land, averaged over 180 days	mg.kg dwt	2.442E-02
Comments		

1.25.2.4.3 Predicted exposure concentration in the atmospheric compartment

Table 158: Predicted exposure concentration in the atmospheric compartment

Local	Concentration,		
Compartment: a	ir	unit	ES25-E1
Annual average (total)	local PEC in air	kg/m ³	1.621E-11
Comments			

1.25.2.4.4 Predicted exposure concentration in food for secondary poisoning

The bioaccumulation potential of this substance is very low, therefore secondary poisoning can be considered negligible. The Kow for DEG is 0.0339.

1.26. Regional exposure concentrations

Table 159: Regional exposure concentrations

Regional concentrations	unit	value
Regional PEC in surface water (total)	mg/L	1.551E+00
Regional PEC in sea water (total)	mg/L	1.513E-01
Regional PEC in air (total)	kg/m ³	7.711E-10
Regional PEC in agricultural soil (total)	kg/kg _{wwt}	8.096E-07
Regional PEC in natural soil (total)	mg/kg dwt	1.161E+00
Regional PEC in industrial soil (total)	mg/kg dwt	1.161E+00
Regional PEC in sediment (total)	mg/kg dwt	4.999E+00
Regional PEC in sea water sediment (total)	mg/kg dwt	4.954E-01
Comments		

2. RISK CHARACTERISATION

General remarks

Environment

In the chemical safety assessment performed according to Article 14(3) in connection with Annex I section 3 (Environmental Hazard Assessment) and section 4 (PBT/ vPvB Assessment) no hazard was identified. Also, according to Annex VI of Directive 67/548/EEC, there is no environmental classification for diethylene glycol.

The aquatic toxicity of the five short chain ethylene glycols (mono-, di-, tri-, tetra- and pentaethylene glycol) were evaluated as a single category. Data on the acute toxicity are available for all three trophic levels (fish, aquatic invertebrates and algae). In the majority of tests no effect was observed, even at concentrations beyond 100 mg/L. All the available data indicate that the members of the category should exhibit low toxicity. Therefore all category members can be evaluated as not harmful to aquatic life.

In addition, diethylene glycol has a low Kow of 0.0339, is not expected to bioaccumulate, and is readily biodegradable. Thus, environmental classification of diethylene glycol for acute or chronic aquatic hazards is not indicated. The environmental assessment was performed using the latest available version of ECETOC TRA. In absence of a marine sediment PNEC, the ECETOC TRA tool extrapolated the marine sediment PNEC value listed in Table 204 below.

Table 160: PNEC's

Compartments	PNEC	
STP	199.5	mg L ⁻¹
Freshwater	10	mg L ⁻¹
Freshwater sediment	20.9	mg kg _{dwt} -1
Marine water	1	mg L ⁻¹
Marine water sediment	3.781E-03	mg kg _{dwt} -1
Soil	1.53	mg kg _{dwt} ⁻¹

<u>Human Health – Worker</u>

Short-term exposure: 2,2'-oxydiethanol is not classified regarding acute inhalative or dermal toxicity.

Thus, an exposure assessment and a risk characterisation regarding short-term exposure (peak exposure) and therefore have not been performed.

<u>Human Health – Consumer</u>

Short-term exposure: 2,2'-oxydiethanol is not classified regarding acute inhalative or dermal toxicity.

Thus, an exposure assessment and a risk characterisation regarding short-term exposure (peak exposure) and therefore have not been performed.

Risk characterisation ratio: The inhalative long-term DNEL is based on local effects observed at long-term

Exposure (20-22 hours) towards Ethan-1,2-diol aerosols in humans. The consumer use was assumed to be of no concern if the "mean concentration on day of exposure" does not exceed the inhalative long-term DNEL. Therefore the RCR inhalative is based on the ratio of the "mean concentration on day of exposure" and the inhalative long-term DNEL.

The inhalative long-term DNEL is derived from local effects observed, whereas the dermal long-term DNEL refers to systemic effects. However, the inhalative long-term DNEL is considered to be protective also from systemic effects. Thus, although addressing different effects, the RCR inhalative and the RCR dermal are added to calculate a RCR combined.

2.1. Manufacturing of substance

2.1.1 Environment

Table 161: RCR's for ES1-E1

Compartments: Risk	
Characterization Ratio	ES1-E1
STP	2.771E-01
Freshwater	5.529E-01
Freshwater sediment	9.999E-01
Soil	1.304E-01
Marine water	5.529E-01
Marine water sediment	5.529E-01

2.1.2 Human Health

2.1.2.1 Workers

Table 162: RCR Workers / PROC 1

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure, systemic/local, inhalative	0.0007	0.004
Long-term exposure, systemic, dermal	0.0032	0.004

Table 163: RCR Workers / PROC 2

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure, systemic/local, inhalative	0.37	0.38
Long-term exposure, systemic, dermal	0.01	0.56

Table 164: RCR Workers / PROC 3

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure,	0.22	
systemic/local, inhalative	0.22	0.22
Long-term exposure,	0.003	0.22
systemic, dermal	0.003	

Table 165: RCR Workers / PROC 4

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure, systemic/local, inhalative	0.37	0.43
Long-term exposure, systemic, dermal	0.06	V.T.J

Table 166: RCR Workers / PROC 8a

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure, systemic/local, inhalative	0.07	0.20
Long-term exposure, systemic, dermal	0.13	0.20

Table 167: RCR Workers / PROC 8b

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure, systemic/local, inhalative	0.37	0.43
Long-term exposure, systemic, dermal	0.06	0.43

Table 168: RCR Workers / PROC 15

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure, systemic/local, inhalative	0.37	0.37
Long-term exposure, systemic, dermal	0.003	0.37

2.1.2.2 Consumers

Not relevant.

2.1.2.3 Indirect exposure to humans via the environment

The substance is classified with R22 (Acute toxicity oral Cat. 4). The hazard classes as well as the entire toxicological profile indicate no severe toxicity with regard to possible exposure of men via the environment. Furthermore, the low log kow of -1.36 implies that an exposure via the food is not likely; the readily biodegradability implies that the substance will rapidly disappear from water and soil via mineralization and therefore will not probably pose a risk for drinking water.

In conclusion, the toxicological and ecotoxicological properties of the substance give no reason for concern regarding a hazard for men via the indirect exposure route. Thus, a quantitative assessment have not been performed.

2.2 Use as Intermediate

2.2.1 Environment

Table 169: RCR's for ES2-E1

Compartments:	Risk	
Characterization Ratio		ES2-E1
STP		1.586E-01
Freshwater		3.171E-01
Freshwater sediment		5.736E-01
Soil		7.463E-02
Marine water		3.171E-01
Marine water sediment	•	3.171E-01

2.2.2 Human Health

2.2.2.1 Workers

For PROC3 see Table 164

For PROC4 see Table 165

For PROC8a see Table 166

For PROC8b see Table 167

For PROC15 see Table 168

Table 170: RCR Workers / PROC 1

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure, systemic/local, inhalative	0.0007	0.004
Long-term exposure, systemic, dermal	0.0032	0.004

Table 171: RCR Workers / PROC 2

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure, systemic/local, inhalative	0.07	0.08
Long-term exposure, systemic, dermal	0.01	0.08

Table 172: RCR Workers / PROC 5

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure, systemic/local, inhalative	0.37	0.38
Long-term exposure, systemic, dermal	0.01	0.50

Table 173: RCR Workers / PROC 9

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure, systemic/local, inhalative	0.37	0.43
Long-term exposure, systemic, dermal	0.06	U.13

2.2.2.2 Consumers

Not relevant.

2.2.2.3 Indirect exposure to humans via the environment

2.3 Use as Process chemical

2.3.1 Environment

Table 174: RCR's for ES3-E1

Compartments: Risk	
Characterization Ratio	ES3-E1
STP	0.000E+00
Freshwater	1.189E-03
Freshwater sediment	2.150E-03
Soil	4.875E-02
Marine water	1.227E-03
Marine water sediment	1.227E-03

2.3.2 Human Health

2.3.2.1 Workers

For PROC1 see Table 170

For PROC2 see Table 171

For PROC3 see Table 164

For PROC4 see Table 165

For PROC5 see Table 172

For PROC8a see Table 166

For PROC8b see Table 167

For PROC9 see Table 173

For PROC15 see Table 168

Table 175: RCR Workers / PROC 13

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure, systemic/local, inhalative	0.74	0.75
Long-term exposure, systemic, dermal	0.01	0.73

Table 176: RCR Workers / PROC 14

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure, systemic/local, inhalative	0.37	0.40
Long-term exposure, systemic, dermal	0.03	

2.3.2.2 Consumers

Not relevant.

2.3.2.3 Indirect exposure to humans via the environment

2.4 Distribution of substance

2.4.1 Environment

Table 177: RCR's for ES4-E1

Compartments: Risk	
Characterization Ratio	ES4-E1
STP	4.229E-06
Freshwater	1.018E-05
Freshwater sediment	1.842E-05
Soil	1.306E-05
Marine water	1.014E-05
Marine water sediment	1.014E-05

2.4.2 Human Health

2.4.2.1 Workers

For PROC1 see Table 170

For PROC2 see Table 171

For PROC3 see Table 164

For PROC4 see Table 165

For PROC8a see Table 166

For PROC8b see Table 167

For PROC9 see Table 173

For PROC15 see Table 168

2.4.2.2 Consumers

Not relevant.

2.4.2.3 Indirect exposure to humans via the environment

2.5 Formulation & (re)packing of substances and mixtures

2.5.1 Environment

Table 178: RCR's for ES5-E1

Compartments:	Risk	
Characterization Ratio		ES5-E1
STP		1.586E-01
Freshwater		3.169E-01
Freshwater sediment		5.732E-01
Soil		8.411E-02
Marine water		3.169E-01
Marine water sediment		3.169E-01

2.5.2 Human Health

2.5.2.1 Workers

For PROC1 see Table 170

For PROC2 see Table 171

For PROC3 see Table 164

For PROC4 see Table 165

For PROC5 see Table 172

For PROC8a see Table 166

For PROC8b see Table 167

For PROC9 see Table 173

For PROC14 see Table 176

For PROC15 see Table 168

2.5.2.2 Consumers

Not relevant.

2.5.2.3 Indirect exposure to humans via the environment

See 2.1.2.3

2.6 Production of polymers

2.6.1 Environment

Table 179: RCR's for ES6-E1

Compartments:	Risk	
Characterization Ratio		ES6-E1
STP		1.586E-01
Freshwater		3.172E-01
Freshwater sediment		5.737E-01
Soil		7.948E-02
Marine water		3.172E-01
Marine water sediment		3.172E-01

2.6.2 Human Health

2.6.2.1 Workers

For PROC1 see Table 170

For PROC2 see Table 171

For PROC3 see Table 164

For PROC4 see Table 165

For PROC5 see Table 172

For PROC8a see Table 166

For PROC8b see Table 167

For PROC9 see Table 173

For PROC15 see Table 168

Table 180: RCR Workers / PROC 6

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure, systemic/local, inhalative	0.37	0.40
Long-term exposure, systemic, dermal	0.03	0.40

2.6.2.2 Consumers

Not relevant.

2.6.2.3 Indirect exposure to humans via the environment

See 2.1.2.3

2.7 Use in Paints/Coatings (industrial)

2.7.1 Environment

Table 181: RCR's for ES7-E1

Compartments: Risk	
Characterization Ratio	ES7-E1
STP	2.668E-01
Freshwater	5.349E-01
Freshwater sediment	9.676E-01
Soil	9.999E-01
Marine water	5.350E-01
Marine water sediment	5.350E-01

2.7.2 Human Health

2.7.2.1 Workers

For PROC1 see Table 170

For PROC2 see Table 171

For PROC3 see Table 164

For PROC4 see Table 165

For PROC5 see Table 172

For PROC8a see Table 166

For PROC8b see Table 167

For PROC13 see Table 175

For PROC15 see Table 168

Table 182: RCR Workers / PROC 7

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure, systemic/local, inhalative	0.01	0.71
Long-term exposure, systemic, dermal	0.70	0.71

Table 183: RCR Workers / PROC 10

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

_	ewithing to the detail and the second		
	Exposure	RCR per route [-]	RCR combined [-]
	Long-term exposure, systemic/local, inhalative	0.74	0.77
	Long-term exposure, systemic, dermal	0.03	0.77

2.7.2.2 Consumers

Not relevant.

2.7.2.3 Indirect exposure to humans via the environment

2.8 Use in Paints/Coatings /Adhesives/ Sealants/ Foams/ Polymers / filled Polymers (professional)

2.8.1 Environment

Given the similar manner in which environmental exposures would be expected to occur in association with both the professional and consumer use of paints and coatings, and given the conservative nature of the high tonnage (based on the estimated EU-wide use of DEG in the production of polymers) used in the assessment, this environmental assessment also covers the environmental assessment for Exposure Scenario 9 (Use in Paints/Coatings /Surface treatment products (Consumer use)).

Table 184: RCR's for ES8-E1

Compartments: Risk	
Characterization Ratio	ES8-E1
STP	3.476E-02
Freshwater	8.301E-02
Freshwater sediment	1.501E-01
Soil	1.228E-01
Marine water	8.284E-02
Marine water sediment	8.284E-02

2.8.2 Human Health

2.8.2.1 Workers

Table 185: RCR Workers / PROC 1

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure, systemic/local, inhalative	0.0007	0.004
Long-term exposure, systemic, dermal	0.0032	0.004

Table 186: RCR Workers / PROC 2

Exposure	RCR per route [-]	RCR combined [-]	
Long-term exposure, systemic/local, inhalative	0.37	0.38	
Long-term exposure, systemic, dermal	0.01	0.38	

Table 187: RCR Workers / PROC 3

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure, systemic/local, inhalative	0.22	0.22
Long-term exposure, systemic, dermal	0.003	0.22

Table 188: RCR Workers / PROC 4

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure, systemic/local, inhalative	0.74	0.80
Long-term exposure, systemic, dermal	0.06	0.00

Table 189: RCR Workers / PROC 5

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure, systemic/local, inhalative	0.74	0.75
Long-term exposure, systemic, dermal	0.01	0.73

Table 190: RCR Workers / PROC 8a

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure, systemic/local, inhalative	0.37	0.50
Long-term exposure, systemic, dermal	0.13	0.50

Table 191: RCR Workers / PROC 8b

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure, systemic/local, inhalative	0.74	0.80
Long-term exposure, systemic, dermal	0.06	0.80

Table 192: RCR Workers / PROC 9

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure, systemic/local, inhalative	0.74	0.80
Long-term exposure, systemic, dermal	0.06	0.80

Table 193: RCR Workers / PROC 10

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure, systemic/local, inhalative	0.37	0.40
Long-term exposure, systemic, dermal	0.03	0.40

Table 194: RCR Workers / PROC 11

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure, systemic/local, inhalative	0.07	0.67
Long-term exposure, systemic, dermal	0.60	0.07

Table 195: RCR Workers / PROC 13

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure, systemic/local, inhalative	0.74	0.75
Long-term exposure, systemic, dermal	0.01	0.73

Table 196: RCR Workers / PROC 14

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure, systemic/local, inhalative	0.74	0.77
Long-term exposure, systemic, dermal	0.03	0.77

Table 197: RCR Workers / PROC 15

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure, systemic/local, inhalative	0.37	0.37
Long-term exposure, systemic, dermal	0.003	0.57

Table 198: RCR Workers / PROC 19¹

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Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure, systemic/local, inhalative	0.18	0.31
Long-term exposure, systemic, dermal	0.13	0.51

2.8.2.2 Consumers

Not relevant.

2.8.2.3 Indirect exposure to humans via the environment

2.9 Use in Paints/Coatings/Surface treatment products (Consumer use)

2.9.1 Environment

See Section 2.8.1.

2.9.2 Human Health

2.9.2.1 Workers

Not relevant

2.9.2.2 Consumers

Table 199: RCR Consumer/ PC 9a and 15

Sub-Scenario 1/Use in Paints/Coatings - non-spraying products

Calculation tool used: ConsExpo 4.1 (see also 1.9)

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure, systemic, inhalative	0.008	
Long-term exposure, systemic, dermal	0.10	0.11
Long-term exposure, systemic, oral	NA	

NA = not applicable

Table 200: RCR Consumer/ PC 9a and 15

Sub-Scenario 2/Use in Paints/Coatings – spraying products

Calculation tool used: ConsExpo 4.1 (see also 1.9)

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure, systemic, inhalative	0.04	
Long-term exposure, systemic, dermal	0.04	
Long-term exposure, systemic, oral	The RCR for oral exposure has not been addressed quantitatively. However, due to the relatively low exposure resulting from oral exposure (see 1.9) in combination with the relatively low dermal and inhalative exposure, the consumer use is considered to be of no concern	0.08 (RCR oral not included)

NA = not applicable

Table 201: RCR Consumer/ PC 18

Calculation tool used: ConsExpo 4.1 (see also 1.9)

Exposure	RCR per route [-]	RCR combined [-]
Part A. Refilling		
Long-term exposure	e, NA	
systemic, inhalative	(see 1.9)	
Long-term exposure	e, 0.001	0.001
systemic, dermal		
Long-term exposure		
systemic, oral	(see 1.9)	
Part B. Printing process		
Long-term exposure	2, 0.19	
systemic, inhalative	0.17	
Long-term exposure	e, NA	0.19
systemic, dermal	(see 1.9)	0.17
Long-term exposure	e, NA	
systemic, oral	(see 1.9)	
Part A and B. Refilling and	Printing process	
Long-term exposure	9, 0.19	
systemic, inhalative	0.19	
Long-term exposure	9, 0.001	0.19
systemic, dermal	0.001	0.19
Long-term exposure	, NA	
systemic, oral	INA	

NA = not applicable

Table 202: RCR Consumer/ PC 31

Calculation tool used: ConsExpo 4.1 (see also 1.9)

Exposure		RCR per route [-]	RCR combined [-]
Long-term exp systemic, inhalative	osure,	0.004	
Long-term exp systemic, dermal	osure,	0.16	0.16
Long-term exp systemic, oral	osure,	NA	

2.9.2.3 Indirect exposure to humans via the environment

2.10 Use in Cleaning agents (industrial)

2.10.1 Environment

Table 203: RCR's for ES10-E1

Compartments: Risk	
Characterization Ratio	ES10-E1
STP	1.586E-02
Freshwater	9.744E-02
Freshwater sediment	1.762E-01
Soil	7.580E-03
Marine water	9.452E-02
Marine water sediment	9.452E-02

2.10.2 Human Health

2.10.2.1 Workers

For PROC1 see Table 170

For PROC2 see Table 171

For PROC3 see Table 164

For PROC4 see Table 165

For PROC7 see Table 182

For PROC8a see Table 166

For PROC8b see Table 167

For PROC10 see Table 183

For PROC13 see Table 175

2.10.2.2 Consumers

Not relevant.

2.10.2.3 Indirect exposure to humans via the environment

2.11 Use in Cleaning agents (professional)

2.11.1 Environment

Given the similar manner in which environmental exposures would be expected to occur in association with both the professional and consumer use of cleaning agents, and given the conservative nature of the high tonnage (based on the estimated EU-wide use of DEG in the production of polymers) used in the assessment, this environmental assessment also covers the environmental assessment for Exposure Scenario 12 (Use in Cleaning agents (Consumer use)).

Table 204: RCR's for ES11-E1

Compartments:	Risk	
Characterization Ratio		ES11-E1
STP		3.476E-02
Freshwater		8.202E-02
Freshwater sediment		1.483E-01
Soil		1.227E-01
Marine water		8.191E-02
Marine water sediment		8.191E-02

2.11.2 Human Health

2.11.2.1 Workers

For PROC1 see Table 185

For PROC2 see Table 186

For PROC3 see Table 187

For PROC4 see Table 188

For PROC8a see Table 190

For PROC8b see Table 191

For PROC10 see Table 193

For PROC11 see Table 194

For PROC13 see Table 175

2.11.2.2 Consumers

Not relevant.

2.11.2.3 Indirect exposure to humans via the environment

2.12 Use in Cleaning agents (Consumer use)

2.12.1 Environment

See Section 2.11.1.

2.12.2 Human Health

2.12.2.1 Workers

Not relevant

2.12.2.2 Consumers

Table 205: RCR Consumer/ PC 35

Sub-Scenario 1/Use in All-purpose cleaners - non-spraying products

Calculation tool used: ConsExpo 4.1 (see also 1.12)

Calculation tool used. Consexpo 4.1 (see also 1.12)			
Exposure		RCR per route [-]	RCR combined [-]
Part A. Mixing an	d Loading		
Long-term	exposure,	RCR is regarded to be	
systemic, inhalative	e	negligible	
Long-term	exposure,	0.0006	0.0006
systemic, dermal		0.0000	0.0000
Long-term	exposure,	NA	
systemic, oral		IVA	
Part B. Applicatio	n		
Long-term	exposure,	0.003	
systemic, inhalative	9	0.003	
Long-term	exposure,	0.22	0.22
systemic, dermal		0.22	0.22
Long-term	exposure,	NA	
systemic, oral		IVA	
Part A and B. Mix	ing/Loadir	ng and Application	
Long-term	exposure,	0.003	
systemic, inhalative	2	0.003	
Long-term	exposure,	0.22	0.22
systemic, dermal		0.22	0.22
Long-term	exposure,	NA	
systemic, oral		1 1/1 1	

NA = not applicable

CAS number: 111-46-6 EC number: 203-872-2

Table 206: RCR Consumer/ PC 35

Sub-Scenario 2/Use in All-purpose cleaners - spraying products Calculation tool used: ConsExpo 4.1 (see also 1.12)

Exposure	RCR per route [-]	RCR combined [-]	
Part A. Spraying			
Long-term exposure,	NA		
systemic, inhalative	(see 1.12)		
Long-term exposure, systemic, dermal	0.0002	0.0002	
Long-term exposure,	NA		
systemic, oral	(see 1.12)		
Part B. Cleaning			
Long-term exposure,	0.0007		
systemic, inhalative Long-term exposure, systemic, dermal	0.002	0.003	
Long-term exposure, systemic, oral	NA		
Part A and B. Mixing/Loading	ng and Application		
Long-term exposure, systemic, inhalative	0.0007		
Long-term exposure, systemic, dermal	0.0002	0.003	
Long-term exposure, systemic, oral	NA		

Table 207: RCR Consumer/ PC 35

Sub-Scenario 3/Use in Floor cleaning products
Calculation tool used: ConsExpo 4.1 (see also 1.12)

Exposure	RCR per route [-]	RCR combined [-]		
Part A. Mixing and Loading				
Long-term exposure, systemic	, NA			
inhalative	(see 1.12)			
Long-term exposure, systemic dermal	0.0002	0.0002		
Long-term exposure, systemic oral	, NA			
Part B. Application				
Long-term exposure, systemic	, 0.004			
inhalative				
Long-term exposure, systemic	, 0.28	0.28		
dermal				
Long-term exposure, systemic	, NA			
oral				
Part A and B. Mixing/Loading		T		
Long-term exposure, systemic	, 0.004			
inhalative				
Long-term exposure, systemic	, 0.28	0.28		
dermal		3.23		
Long-term exposure, systemic	, NA			
oral	1111			

2.13 Use in Biocidal Products (Consumer use)

2.13.1 Environment

Table 208: RCR's for ES13-E1

Compartments: Risk	
Characterization Ratio	ES13-E1
STP	3.476E-02
Freshwater	8.301E-02
Freshwater sediment	1.501E-01
Soil	1.228E-01
Marine water	8.284E-02
Marine water sediment	8.284E-02

2.13.2 Human Health

2.13.2.1 Workers

Not relevant

2.13.2.2 Consumers

Table 209: RCR Consumer/PC 8

Calculation tool used: ConsExpo 4.1 (see also 9.12)

Exposure		RCR per route [-]	RCR combined [-]
Part A. Spraying			
Long-term ex systemic, inhalative	xposure,	RCR is regarded to be negligible	
Long-term ex systemic, dermal	xposure,	0.0008	
Long-term exsystemic, oral	xposure,	The RCR for oral exposure has not been addressed quantitatively. However, due to the relatively low exposure resulting from oral exposure (see 1.9) in combination with the relatively low dermal and inhalative exposure, the consumer use is considered to be of no concern	0.0008
Part B. Wiping			
Long-term ex systemic, inhalative	xposure,	NA	
Long-term ex systemic, dermal	xposure,	0.0006	0.0006
Long-term ex systemic, oral	xposure,	NA	
Part A and B. Mixing/Loading and Application			
Long-term ex	xposure,	NA	0.001

systemic, inhalativ	e		
Long-term systemic, dermal	exposure,	0.001	
Long-term systemic, oral	exposure,	NA	

NA = not applicable

2.13.2.3 Indirect exposure to humans via the environment

2.14 Use in Lubricants (industrial)

2.14.1 Environment

Table 210: RCR's for ES14-E1

Compartments: Risk	
Characterization Ratio	ES14-E1
STP	1.586E-03
Freshwater	3.281E-03
Freshwater sediment	5.935E-03
Soil	7.860E-04
Marine water	3.275E-03
Marine water sediment	3.275E-03

2.14.2 Human Health

2.14.2.1 Workers

For PROC1 see Table 170

For PROC2 see Table 171

For PROC3 see Table 164

For PROC4 see Table 165

For PROC7 see Table 182

For PROC8a see Table 166

For PROC8b see Table 167

For PROC9 see Table 173

For PROC10 see Table 183

For PROC13 see Table 175

Table 211: RCR Workers / PROC 17

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure, systemic/local, inhalative	0.07	0.10
Long-term exposure, systemic, dermal	0.03	0.10

Table 212: RCR Workers / PROC 18

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure, systemic/local, inhalative	0.07	0.20
Long-term exposure, systemic, dermal	0.13	0.20

2.14.2.2 Consumers

Not relevant.

2.14.2.3 Indirect exposure to humans via the environment

2.15 Use in Metal-working fluids (industrial)

2.15.1 Environment

Table 213: RCR's for ES15-E1

Compartments: Risk	
Characterization Ratio	ES15-E1
STP	1.586E-03
Freshwater	3.586E-03
Freshwater sediment	6.487E-03
Soil	7.179E-03
Marine water	3.595E-03
Marine water sediment	3.595E-03

2.15.2 Human Health

2.15.2.1 Workers

For PROC1 see Table 170

For PROC2 see Table 171

For PROC3 see Table 164

For PROC5 see Table 172

For PROC7 see Table 182

For PROC8a see Table 166

For PROC8b see Table 167

For PROC9 see Table 173

For PROC10 see Table 183

For PROC13 see Table 175

For PROC17 see Table 211

2.15.2.2 Consumers

Not relevant.

2.15.2.3 Indirect exposure to humans via the environment

See 2.1.2.3

2.16 Use in Metal-working fluids (professional)

2.16.1 Environment

Table 214: RCR's for ES16-E1

Compartments: Risk	
Characterization Ratio	ES16-E1
STP	3.476E-02
Freshwater	8.202E-02
Freshwater sediment	1.483E-01
Soil	1.227E-01
Marine water	8.191E-02
Marine water sediment	8.191E-02

2.16.2 Human Health

2.16.2.1 Workers

For PROC1 see Table 185

For PROC2 see Table 186

For PROC3 see Table 187

For PROC5 see Table 189

For PROC8a see Table 190

For PROC8b see Table 191

For PROC9 see Table 192

For PROC10 see Table 193

For PROC11 see Table 194

For PROC13 see Table 175

Table 215: RCR Workers / PROC 17

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure,	0.34	
systemic/local, inhalative		0.37
Long-term exposure,	0.03	0.57
systemic, dermal	0.03	

2.16.2.2 Consumers

Not relevant.

2.16.2.3 Indirect exposure to humans via the environment

2.17 Use in Functional fluids (industrial)

2.17.1 Environment

Table 216: RCR's for: ES17-E1

Compartments:	Risk	
Characterization Ratio		ES17-E1
STP		1.586E-04
Freshwater		4.376E-04
Freshwater sediment		7.916E-04
Soil		1.887E-04
Marine water		4.318E-04
Marine water sediment		4.318E-04

2.17.2 Human Health

2.17.2.1 Workers

For PROC1 see Table 170

For PROC2 see Table 171

For PROC3 see Table 164

For PROC4 see Table 165

For PROC8a see Table 166

For PROC8b see Table 167

For PROC9 see Table 173

2.17.2.2 Consumers

Not relevant.

2.17.2.3 Indirect exposure to humans via the environment

See 2.1.2.3

2.18 Use in Functional fluids (professional)

2.18.1 Environment

Given the similar manner in which environmental exposures would be expected to occur in association with both the professional and consumer use of functional fluids, and given the conservative nature of the high tonnage (based on the estimated EU-wide use of DEG in the production of polymers) used in the assessment, this environmental assessment also covers the environmental assessment for Exposure Scenario 19 (Use in Heat transfer and Hydraulic fluids (Consumer use)).

Table 217: RCR's for ES18-E1

Compartments:	Risk	
Characterization Ratio		ES18-E1
STP		1.738E-03
Freshwater		4.348E-03
Freshwater sediment		7.865E-03
Soil		6.172E-03
Marine water		4.327E-03
Marine water sediment		4.327E-03

2.18.2 Human Health

2.18.2.1 Workers

For PROC1 see Table 185

For PROC2 see Table 186

For PROC3 see Table 187

For PROC5 see Table 189

For PROC8a see Table 190

For PROC9 see Table 192

Table 218: RCR Workers / PROC 20

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure, systemic/local, inhalative	0.50	0.53
Long-term exposure, systemic, dermal	0.03	0.55

2.18.2.2 Consumers

Not relevant.

10.18.2.3 Indirect exposure to humans via the environment

See 2.1.2.3

2.19 Use in Heat transfer and Hydraulic fluids (Consumer use)

2.19.1 Environment

See Section 2.18.1.

2.19.2 Human Health

2.19.2.1 Workers

Not relevant

2.19.2.2 Consumers

Table 219: RCR Consumer/ PC 16 and 17

Calculation tool used: ECETOC TRA (worker) v2.0 modified (see 1. General remarks)

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure,	0.41	
systemic, inhalative		
Long-term exposure,	0.12	0.53
systemic, dermal	0.12	0.55
Long-term exposure,	NA	
systemic, oral	(see 1.19)	

NA = not applicable

2.20 Use in/as De-icing/Anti-icing applications/agents (professional)

2.20.1 Environment

Given the similar manner in which environmental exposures would be expected to occur in association with both the professional and consumer use of de-icing products, and given the conservative nature of the high tonnage (based on the estimated EU-wide use of DEG in the production of polymers) used in the assessment, this environmental assessment also covers the environmental assessment for Exposure Scenario 21 (Use in/as De-icing/Anti-icing applications/agents (Consumer Use)).

Table 220: RCR's for ES20-E1

Compartments: Risk	
Characterization Ratio	ES20-E1
STP	3.476E-02
Freshwater	8.301E-02
Freshwater sediment	1.501E-01
Soil	1.228E-01
Marine water	8.284E-02
Marine water sediment	8.284E-02

2.20.2 Human Health

2.20.2.1 Workers

For PROC1 see Table 185

For PROC2 see Table 186

For PROC8a see Table 190

For PROC8b see Table 192

For PROC11 see Table 194

2.20.2.2 Consumers

Not relevant.

2.20.2.3 Indirect exposure to humans via the environment

2.21 Use in/as De-icing/Anti-icing applications/agents (Consumer use)

2.21.1 Environment

See Section 2.20.1.

2.21.2 Human Health

2.21.2.1 Workers

Not relevant

2.21.2.2 Consumers

Table 221: RCR Consumer/ PC 4

Sub-Scenario 1/Use in De-icing applicatons – spraying products

Calculation tool used: ConsExpo 4.1 (see also 1.12)

Exposure		RCR per route [-]	RCR combined [-]
Part A. Spraying			
systemic, inhalative		RCR is regarded to be negligible	
systemic, dermal	exposure,	0.009	
Long-term systemic, oral	exposure,	The RCR for oral exposure has not been addressed quantitatively. However, due to the relatively low exposure resulting from oral exposure (see 1.9) in combination with the relatively low dermal and inhalative exposure, the consumer use is considered to be of no concern	0.009
Part B. Cleaning			
Long-term systemic, inhalative	exposure,	NA	
Long-term systemic, dermal	exposure,	0.08	0.08
Long-term systemic, oral	exposure,	NA	
Part A and B. Spraying and Cleaning			
systemic, inhalative	exposure,	NA	
systemic, dermal	exposure,	0.09	0.09
Long-term systemic, oral	exposure,	NA	

NA = not applicable

Table 222: RCR Consumer/ PC 4

Sub-Scenario 2/ Use in Anti-freeing agents

Calculation tool used: ECETOC TRA (worker) v2.0 modified (see 1. General remarks)

Exposure		RCR per route [-]	RCR combined [-]
Long-term systemic, inhalativ	exposure,	0.41	
Long-term systemic, dermal	exposure,	0.12	0.53
Long-term	exposure,		
systemic, oral		(see 1.21)	

NA = not applicable

2.21.2.3 Indirect exposure to humans via the environment

2.22 Use in laboratories (professional)

2.22.1 Environment

Table 223: RCR's for ES22-E1

Compartments: Risk	
Characterization Ratio	ES22-E1
STP	3.476E-02
Freshwater	8.202E-02
Freshwater sediment	1.483E-01
Soil	1.227E-01
Marine water	8.191E-02
Marine water sediment	8.191E-02

2.22.2 Human Health

2.22.2.1 Workers

For PROC15 (industrial) see Table 168

Table 224: RCR Workers / PROC 15 (professional)

Calculation tool used: ECETOC TRA v2.0 modified (see 1. General remarks)

Exposure	RCR per route [-]	RCR combined [-]	
Long-term exposure, systemic/local, inhalative	0.37	0.37	
Long-term exposure, systemic, dermal	0.003	0.57	

2.22.2.2 Consumers

Not relevant.

2.22.2.3 Indirect exposure to humans via the environment

2.23 Use in Adhesives and Sealants (Consumer use)

2.23.1 Environment

Table 225: RCR's for ES23-E1

Compartments: Risk	
Characterization Ratio	ES23-E1
STP	3.476E-04
Freshwater	1.652E-03
Freshwater sediment	2.988E-03
Soil	1.611E-02
Marine water	1.677E-03
Marine water sediment	1.677E-03

2.23.2 Human Health

2.23.2.1 Workers

Not relevant

2.23.2.2 Consumers

Table 226: RCR Consumer/ PC 1

Calculation tool used: ConsExpo 4.1 (see also 1.24)

Exposure	RCR per route [-]	RCR combined [-]
Long-term exposure systemic, inhalative	0.06	
Long-term exposure systemic, dermal	0.005	0.07
Long-term exposure systemic, oral	NA	

2.23.2.3 Indirect exposure to humans via the environment

See 2.1.2.3

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2.24 Production of Polymers, filled polymers, Foams, Coatings, Adhesives, Sealants (industrial)

2.24.1 Environment

Table 227: RCR's for ES24-E1

Compartments:	Risk	
Characterization Ratio		ES24-E1
STP		1.586E-01
Freshwater		3.172E-01
Freshwater sediment		5.737E-01
Soil		7.948E-02
Marine water		3.172E-01
Marine water sediment		3.172E-01

2.24.2 Human Health

2.24.2.1 Workers

For PROC1 see Table 170

For PROC2 see Table 171

For PROC3 see Table 164

For PROC4 see Table 165

For PROC7 see Table 182

For PROC8a see Table 166

For PROC8b see Table 167

For PROC9 see Table 173

For PROC10 see Table 183

For PROC13 see Table 175

For PROC14 see Table 176

For PROC15 see Table 168

2.24.2.2 Consumers

Not relevant.

2.24.2.3 Indirect exposure to humans via the environment

See 2.1.2.3

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2.25 Production of rigid foam (Consumer use)

2.25.1 Environment

Table 228: RCR's for ES25-E1

Compartments: Risk	
Characterization Ratio	ES25-E1
STP	3.476E-04
Freshwater	1.677E-03
Freshwater sediment	3.033E-03
Soil	1.611E-02
Marine water	1.701E-03
Marine water sediment	1.701E-03

2.25.2 Human Health

2.25.2.1 Workers

Not relevant

2.25.2.2 Consumers

Table 229: RCR Consumer/ PC 32

Calculation tool used: ConsExpo 4.1 (see also1.26)

Exposure		RCR per route [-]	RCR combined [-]
Long-term systemic, inhalativ	exposure,	0.006	
Long-term	exposure,	0.004	0.01
systemic, dermal			
Long-term	exposure,	NA	
systemic, oral		INA	

2.25.2.3 Indirect exposure to humans via the environment

2.26. Overall exposure (combined for all relevant emission /release sources)

2.26.1 Environment (combined for all emission sources)

Each exposure scenario has been individually run in ECETOC TRA using either conservative industry wide tonnages or maximum passing tonnages using Specific Environmental Release Categories (SpERCs). This approach was employed in part to avoid the unreasonable repetitive addition of regional exposures and risks to local exposures and risks that occurs when scenarios are run together in ECETOC TRA. The total regional PECs and RCRs were then estimates for each environmental compartment by summing the PECs and RCRs for all individual scenarios, resulting in passing regional RCRs for all scenarios.

Table 230: Regional RCR's

Compartments: (REGIONAL)	RCR
Freshwater	1.551E-01
Freshwater sediment	2.392E-01
Soil	5.292E-01
Marine water	1.513E-01
Marine water sediment	1.310E-01

2.26.2 Human health (combined for all exposure routes)

The consideration of an overall exposure is considered to be not relevant since the vast majority of the PROCs and PCs calculated do not yield to a RCR close to 1

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