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

1.1. Product identifier

Trade name
ANTIFROGEN N WATER-MIXTURE 39%

Material number: 112063

Chemical nature: Monoethylene glycol (1,2-ethane diol) and corrosion inhibitors in aqueous solution (39% active)

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

Relevant identified uses of the substance or mixture

Industry sector :	Functional Fluids
Type of use :	Brine for refrigeration

Exposure scenarios: see annex

1.3. Details of the supplier of the safety data sheet

Identification of the company
Clariant Produkte (Deutschland) GmbH
65926 Frankfurt am Main
Telephone no. : +49 69 305 18000

Information about the substance/mixture
BU Industrial & Consumer Specialties
Product Stewardship
e-mail: SDS.Europe@clariant.com

1.4. Emergency telephone number

00800-5121 5121 (24 h)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification (REGULATION (EC) No 1272/2008)

Acute toxicity, Category 4	H302: Harmful if swallowed.
Specific target organ toxicity - repeated exposure, Category 2	H373: May cause damage to organs through prolonged or repeated exposure.

2.2 Label elements

Labelling (REGULATION (EC) No 1272/2008)

Hazard pictograms :

Signal word : Warning

Hazard statements : H302 Harmful if swallowed.

H373 May cause damage to organs through prolonged or repeated exposure.

Precautionary statements :

Prevention:

P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response:

P314 Get medical advice/ attention if you feel unwell.
P337 + P313 If eye irritation persists: Get medical advice/ attention.

Disposal:

P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Other hazards

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.
No additional hazards are known except those derived from the labelling.

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Hazardous components

Chemical name	CAS-No. EC-No. Index-No. Registration number	Classification	Concentration (% w/w)
Ethanediol	107-21-1 203-473-3 603-027-00-1 01-2119456816-28 01-2119456816-28-0000 01-2119456816-28-0003 01-2119456816-28-0038 01-2119456816-28-XXXX	STOT RE 2; H373 Acute Tox. 4; H302	>= 30 - < 50
Ethanediol	107-21-1 203-473-3 603-027-00-1 01-2119456816-28 01-2119456816-28-0000 01-2119456816-28-	STOT RE 2; H373 Acute Tox. 4; H302	38 - 42

	0003 01-2119456816-28-0038 01-2119456816-28-XXXX		

For explanation of abbreviations see section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice : Remove/Take off immediately all contaminated clothing.

If inhaled : If inhaled, remove to fresh air.
Get medical advice/ attention.

In case of skin contact : In case of contact, immediately flush skin with plenty of water.

In case of eye contact : In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

If swallowed : Get medical attention immediately.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms : No symptoms known currently.

Risks : No hazards known at this time.

4.3 Indication of any immediate medical attention and special treatment needed

Treatment : Treat symptomatically.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media : Not combustible.
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

5.2 Special hazards arising from the substance or mixture

Specific hazards during firefighting : In case of fires, hazardous combustion gases are formed:
Carbon monoxide (CO)
Nitrogen oxides (NOx)

5.3 Advice for firefighters

Special protective equipment for firefighters : Self-contained breathing apparatus

Further information : Wear suitable protective equipment.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal precautions : Ensure adequate ventilation.
Wear suitable protective equipment.

6.2 Environmental precautions

Environmental precautions : Do not allow to enter drains or waterways

6.3 Methods and material for containment and cleaning up

Methods for cleaning up : Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust).

Can be landfilled or incinerated, when in compliance with local regulations.

6.4 Reference to other sections

Information regarding Safe handling, see chapter 7., For personal protection see section 8., For disposal considerations see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling : Handle and open container with care.
Ensure adequate ventilation.

Advice on protection against fire and explosion : Not combustible.

Hygiene measures : Keep away from food and drink.

7.2 Conditions for safe storage, including any incompatibilities

Further information on storage conditions : Keep containers tightly closed in a cool, well-ventilated place.
Handle and open container with care.

Other data : Storage time: 24 months

7.3 Specific end use(s)

Specific use(s) : No further recommendations.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational Exposure Limits

Components	CAS-No.	Value type (Form of exposure)	Control parameters	Basis
Ethanediol	107-21-1	TWA	20 ppm 52 mg/m3	2000/39/EC
Further information	Identifies the possibility of significant uptake through the skin, Indicative			
		STEL	40 ppm 104 mg/m3	2000/39/EC
Further information	Identifies the possibility of significant uptake through the skin, Indicative			

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

Substance name	End Use	Exposure routes	Potential health effects	Value
Ethanediol CAS-No.: 107-21-1	Workers	Dermal	Long-term systemic effects	106 mg/kg bw/day
Remarks:	DNEL			
	Workers	Inhalation	Long-term local effects	35 mg/m3
Remarks:	DNEL			
	General population	Dermal	Long-term systemic effects	53 mg/kg bw/day
Remarks:	DNEL			
	General population	Inhalation	Long-term local effects	7 mg/m3
Hexanoic acid, 3,5,5-trimethyl- CAS-No.: 3302-10-1	Workers	Skin contact	Long-term systemic effects	2 mg/kg bw/day
Remarks:	DNEL			
	Workers	Inhalation	Long-term systemic effects	7 mg/m3
Remarks:	DNEL			
	Consumer use	Skin contact	Long-term systemic effects	1 mg/kg bw/day
Remarks:	DNEL			
	Consumer use	Inhalation	Long-term systemic effects	2 mg/m3
Remarks:	DNEL			
	Consumer use	Ingestion	Long-term systemic effects	1 mg/kg bw/day
Remarks:	DNEL			
Ethanediol CAS-No.: 107-21-1	Workers	Dermal	Long-term systemic effects	106 mg/kg bw/day
Remarks:	DNEL			
	Workers	Inhalation	Long-term local effects	35 mg/m3
Remarks:	DNEL			
	General population	Dermal	Long-term systemic effects	53 mg/kg bw/day

Remarks:	DNEL			
	General population	Inhalation	Long-term local effects	7 mg/m3

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

Substance name	Environmental Compartment	Value
Ethanediol CAS-No.: 107-21-1	Fresh water	10 mg/l
	salt water	1 mg/l
	Water (intermittent release)	10 mg/l
	Fresh water sediment	37 mg/kg dry weight (d.w.)
	Soil	1,53 mg/kg dry weight (d.w.)
	Sewage treatment plant	199,5 mg/l
	Marine sediment	3,7 mg/kg dry weight (d.w.)
Hexanoic acid, 3,5,5-trimethyl- CAS-No.: 3302-10-1	Fresh water	0,068 mg/l
	Marine water	0,0068 mg/l
	intermittent releases	1,36 mg/l
	Sewage treatment plant	23 mg/l
	Fresh water sediment	0,904 mg/kg
	Marine sediment	0,0904 mg/kg
	Soil	0,141 mg/kg
Ethanediol CAS-No.: 107-21-1	Fresh water	10 mg/l
	salt water	1 mg/l
	Water (intermittent release)	10 mg/l
	Fresh water sediment	37 mg/kg dry weight (d.w.)
	Soil	1,53 mg/kg dry weight (d.w.)
	Sewage treatment plant	199,5 mg/l
	Marine sediment	3,7 mg/kg dry weight (d.w.)

8.2 Exposure controls

Personal protective equipment

Eye protection : Depending on the risk, wear sufficient eye protection (safety glasses with side protection or goggles, and if necessary, face shield.)

Hand protection

Break through time : 480 min
Glove thickness : 0,7 mm
Remarks : Long-term exposure Impervious butyl rubber gloves

Break through time : 30 min
Glove thickness : 0,4 mm
Remarks : For short-term exposure (splash protection): Nitrile rubber gloves.

Remarks	:	These types of protective gloves are offered by various manufacturers. Please note the manufacturers´ detailed statements, especially about the minimum thickness and the minimum breakthrough time. Consider also the particular working conditions under which the gloves are being used.
Respiratory protection	:	Use respiratory protection in case of insufficient exhaust ventilation or prolonged exposure Full mask to standard DIN EN 136 Filter A (organic gases and vapours) to standard DIN EN 141 The use of filter apparatus presupposes that the environment atmosphere contains at least 17% oxygen by volume, and does not exceed the maximum gas concentration, usually 0.5% by volume. Relevant guidelines to be considered include EN 136/141/143/371/372 as well as other national regulations.
Protective measures	:	Do not inhale vapours

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance	:	Liquid
Colour	:	light yellow
Odour	:	slightly perceptible
Odour Threshold	:	not tested.
pH	:	approx. 8 (20 °C) Concentration: 100 g/l Method: DIN 19268
Melting point	:	-26 °C Method: DIN 51583
Boiling point	:	106 °C (1.013 hPa) Method: ASTM D 1120
Flash point	:	Method: ASTM D6450 (closed cup) does not flash
Evaporation rate	:	not tested.
Burning number	:	Not applicable
Upper explosion limit	:	not tested.
Lower explosion limit	:	not tested.

Vapour pressure	:	< 0,01 kPa (20 °C) Method: Calculated by Syracuse.
Relative vapour density	:	not tested.
Density	:	1,0542 g/cm3 (20 °C) Method: DIN 51757
Bulk density	:	Not applicable
Solubility(ies)		
Water solubility	:	completely miscible (20 °C)
Solubility in other solvents	:	not tested. Solvent: fat
Partition coefficient: n-octanol/water	:	not determined
Auto-ignition temperature	:	Method: DIN 51794 Not applicable for Liquids with Flash Point > 70 °C.
Decomposition temperature	:	> 250 °C Method: DSC Measurement under nitrogen No decomposition up to 250 °C.
Viscosity		
Viscosity, dynamic	:	3,05 mPa.s (20 °C)
Viscosity, kinematic	:	2,89 mm2/s (20 °C) Method: DIN 51562
Explosive properties	:	Not explosive Method: Expert judgement
Oxidizing properties	:	The substance or mixture is not classified as oxidizing. Method: Expert judgement

9.2 Other information

Surface tension	:	Not applicable
Metal corrosion rate	:	< 6,25 mm/a
Minimum ignition energy	:	not tested.
Particle size	:	Not applicable
Self-ignition	:	Not applicable

SECTION 10: Stability and reactivity

10.1 Reactivity

See section 10.3. "Possibility of hazardous reactions"

10.2 Chemical stability

Stable under normal conditions.

10.3 Possibility of hazardous reactions

Hazardous reactions : Incompatible with oxidizing agents.

10.4 Conditions to avoid

Conditions to avoid : None known.

10.5 Incompatible materials

Materials to avoid : not known

10.6 Hazardous decomposition products

When handled and stored appropriately, no dangerous decomposition products are known

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Product:

Acute oral toxicity : Remarks: not tested.

Acute toxicity estimate: 1.248 mg/kg
Method: Calculation method

Acute inhalation toxicity : Remarks: no data available

Acute dermal toxicity : Remarks: no data available

Components:

Ethanediol:

Acute oral toxicity : LD50 (Rat, male and female): 22.000 mg/kg
Method: Other
GLP: no

Acute inhalation toxicity : LC50 (Rat, male and female): > 2,5 mg/l
Exposure time: 6 h
Method: Other
GLP: yes

Acute dermal toxicity : LD50 (Mouse, male and female): > 3.500 mg/kg
Method: Other
GLP: yes

Ethanediol:

Acute oral toxicity	:	LD50 (Rat, male and female): 22.000 mg/kg Method: Other GLP: no
Acute inhalation toxicity	:	LC50 (Rat, male and female): > 2,5 mg/l Exposure time: 6 h Method: Other GLP: yes
Acute dermal toxicity	:	LD50 (Mouse, male and female): > 3.500 mg/kg Method: Other GLP: yes

Skin corrosion/irritation

Product:

Remarks: no data available

Components:

Ethanediol:

Species: Rabbit
Exposure time: 20 h
Method: BASF test
Result: No skin irritation
GLP: no

Ethanediol:

Species: Rabbit
Exposure time: 20 h
Method: BASF test
Result: No skin irritation
GLP: no

Serious eye damage/eye irritation

Product:

Remarks: no data available

Components:

Ethanediol:

Species: rabbit eye
Exposure time: 24 h
Method: BASF test
Result: non-irritant
GLP: no

Ethanediol:

Species: rabbit eye
Exposure time: 24 h
Method: BASF test
Result: non-irritant
GLP: no

Respiratory or skin sensitisation

Product:

Remarks: no data available

Components:

Ethanediol:

Test Type: Maximisation Test
Exposure routes: Skin contact
Species: Guinea pig
Method: OECD Test Guideline 406
Result: Does not cause skin sensitisation.
GLP: yes

Ethanediol:

Test Type: Maximisation Test
Exposure routes: Skin contact
Species: Guinea pig
Method: OECD Test Guideline 406
Result: Does not cause skin sensitisation.
GLP: yes

Germ cell mutagenicity

Product:

Germ cell mutagenicity-Assessment : No information available.

Components:

Ethanediol:

Genotoxicity in vitro : Test Type: Ames test
Species: Salmonella typhimurium
Concentration: 33 - 5000 µg/plate
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative
GLP: yes

: Test Type: Ames test
Species: Escherichia coli
Concentration: 33 - 5000 µg/plate
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471

Result: negative
GLP: yes

Genotoxicity in vivo : Test Type: Dominant lethal assay
Species: Rat (male and female)
Strain: Fischer F344
Application Route: oral (feed)
Exposure time: 3 generation
Dose: 40 - 200 - 1000 mg/kg
Method: Other
Result: negative
GLP: no

Germ cell mutagenicity-Assessment : It is concluded that the product is not mutagenic based on evaluation of several mutagenicity tests.

Ethanediol:

Genotoxicity in vitro : Test Type: Ames test
Species: Salmonella typhimurium
Concentration: 33 - 5000 µg/plate
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative
GLP: yes

: Test Type: Ames test
Species: Escherichia coli
Concentration: 33 - 5000 µg/plate
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative
GLP: yes

Genotoxicity in vivo : Test Type: Dominant lethal assay
Species: Rat (male and female)
Strain: Fischer F344
Application Route: oral (feed)
Exposure time: 3 generation
Dose: 40 - 200 - 1000 mg/kg
Method: Other
Result: negative
GLP: no

Germ cell mutagenicity-Assessment : It is concluded that the product is not mutagenic based on evaluation of several mutagenicity tests.

Carcinogenicity

Product:

Carcinogenicity - Assessment : No information available.

Components:

Ethanediol:

Carcinogenicity - Assessment	:	Not classifiable as a human carcinogen.

Ethanediol:

Carcinogenicity - Assessment	:	Not classifiable as a human carcinogen.

Reproductive toxicity

Product:

Reproductive toxicity - Assessment	:	No information available. No information available.

Components:

Ethanediol:

Effects on fertility	:	Species: Rat, male and female Strain: Fischer F344 Application Route: oral (feed) Dose: 40 - 200 - 1000 General Toxicity - Parent: NOAEL: > 1.000 mg/kg body weight General Toxicity F1: NOAEL: > 1.000 mg/kg body weight General Toxicity F2: NOAEL: > 1.000 mg/kg body weight Method: Other GLP: no
Effects on foetal development	:	Species: Rat Strain: Sprague-Dawley Application Route: oral (gavage) Dose: 150 - 500 - 1000 - 2500 mg/kg General Toxicity Maternal: NOAEL: 1.000 mg/kg body weight Teratogenicity: NOAEL: 500 mg/kg body weight Method: Other GLP: yes
Reproductive toxicity - Assessment	:	No reproductive toxicity to be expected. No teratogenic effects to be expected.

Ethanediol:

Effects on fertility	:	Species: Rat, male and female Strain: Fischer F344 Application Route: oral (feed) Dose: 40 - 200 - 1000 General Toxicity - Parent: NOAEL: > 1.000 mg/kg body weight General Toxicity F1: NOAEL: > 1.000 mg/kg body weight General Toxicity F2: NOAEL: > 1.000 mg/kg body weight Method: Other GLP: no

Effects on foetal development	:	Species: Rat Strain: Sprague-Dawley Application Route: oral (gavage) Dose: 150 - 500 - 1000 - 2500 mg/kg General Toxicity Maternal: NOAEL: 1.000 mg/kg body weight Teratogenicity: NOAEL: 500 mg/kg body weight Method: Other GLP: yes
Reproductive toxicity - Assessment	:	No reproductive toxicity to be expected. No teratogenic effects to be expected.

STOT - single exposure

Product:

Remarks: no data available

Components:

Ethanediol:

Assessment: The substance or mixture is not classified as specific target organ toxicant, single exposure.

Ethanediol:

Assessment: The substance or mixture is not classified as specific target organ toxicant, single exposure.

STOT - repeated exposure

Product:

Remarks: no data available

Components:

Ethanediol:

Target Organs: Kidney
Assessment: May cause damage to organs through prolonged or repeated exposure.

Ethanediol:

Target Organs: Kidney
Assessment: May cause damage to organs through prolonged or repeated exposure.

Repeated dose toxicity

Product:

Remarks: no data available

Components:

Ethanediol:

Species: Rat, male
NOAEL: 150 mg/kg
Application Route: oral (feed)
Exposure time: 16 w
Number of exposures: daily
Dose: 50 - 150 - 500 - 1000 mg/kg
Group: yes
Method: OECD Test Guideline 408
GLP: yes

Species: Dog, male
NOAEL: ca. 2.200 mg/kg
Application Route: Skin contact
Exposure time: 4 w
Number of exposures: daily
Dose: 0,5 - 2 - 8 ml/kg
Group: yes
Method: OECD Test Guideline 410
GLP: yes

Ethanediol:

Species: Rat, male
NOAEL: 150 mg/kg
Application Route: oral (feed)
Exposure time: 16 w
Number of exposures: daily
Dose: 50 - 150 - 500 - 1000 mg/kg
Group: yes
Method: OECD Test Guideline 408
GLP: yes

Species: Dog, male
NOAEL: ca. 2.200 mg/kg
Application Route: Skin contact
Exposure time: 4 w
Number of exposures: daily
Dose: 0,5 - 2 - 8 ml/kg
Group: yes
Method: OECD Test Guideline 410
GLP: yes

Aspiration toxicity

Product:

no data available

Components:

Ethanediol:

No aspiration toxicity classification

Ethanediol:

No aspiration toxicity classification

Further information

Product:

Remarks: Kidney injury may occur.

Remarks: Poisoning affects the central nervous system

Remarks: The data on toxicology refer to the active ingredient.

Remarks: The classification was made by the conventional (calculation) method of the CLP Regulation (EC) No 1272/2008.

SECTION 12: Ecological information

12.1 Toxicity

Product:

Toxicity to fish	:	LC0 (Leuciscus idus (Golden orfe)): 1.000 mg/l Remarks: By analogy with a product of similar composition LL50 (Danio rerio (zebra fish)): > 100 mg/l Exposure time: 96 h Test Type: static test Method: OECD Test Guideline 203 GLP: yes Remarks: By analogy with a product of similar composition
Toxicity to daphnia and other aquatic invertebrates	:	Remarks: no data available
Toxicity to algae	:	Remarks: no data available
Toxicity to microorganisms	:	Remarks: no data available

Components:

Ethanediol:

Toxicity to fish	:	LC50 (Pimephales promelas (fathead minnow)): 72.860 mg/l Exposure time: 96 h Test Type: static test Analytical monitoring: yes Method: EPA GLP: no Remarks: The details of the toxic effect relate to the nominal concentration.
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Daphnia magna (Water flea)): > 100 mg/l Exposure time: 48 h Test Type: static test

		Analytical monitoring: yes Method: OECD Test Guideline 202 GLP: yes
Toxicity to algae	:	EC50 (Pseudokirchneriella subcapitata (green algae)): 6.500 - 13.000 mg/l End point: Growth rate Exposure time: 7 d Test Type: static test Analytical monitoring: no data available Method: EPA GLP: No information available.
Toxicity to microorganisms	:	EC20 (activated sludge, domestic): > 1.995 mg/l End point: Bacteria toxicity (respiration inhibition) Exposure time: 0,5 h Analytical monitoring: no Method: ISO 8192 GLP: no Remarks: By analogy with a product of similar composition
Toxicity to fish (Chronic toxicity)	:	Chronic Toxicity Value: 2.629 mg/l End point: Other Exposure time: 30 d Species: Fish Method: Other GLP: no Remarks: The details of the toxic effect relate to the nominal concentration.
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	NOEC: 8.590 mg/l End point: Reproduction rate Exposure time: 7 d Species: Ceriodaphnia spec. Test Type: semi-static test Analytical monitoring: yes Method: Other GLP: No information available. Remarks: The details of the toxic effect relate to the nominal concentration.
Toxicity to soil dwelling organisms	:	Remarks: The study is not necessary from a scientific perspective.
Plant toxicity	:	Remarks: The study is not necessary from a scientific perspective.
Sediment toxicity	:	Remarks: The study is not necessary from a scientific perspective.
Toxicity to terrestrial organisms	:	Remarks: The study is not necessary from a scientific perspective.

Ethanediol:

Toxicity to fish	:	LC50 (Pimephales promelas (fathead minnow)): 72.860 mg/l Exposure time: 96 h Test Type: static test Analytical monitoring: yes Method: EPA GLP: no Remarks: The details of the toxic effect relate to the nominal concentration.
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Daphnia magna (Water flea)): > 100 mg/l Exposure time: 48 h Test Type: static test Analytical monitoring: yes Method: OECD Test Guideline 202 GLP: yes
Toxicity to algae	:	EC50 (Pseudokirchneriella subcapitata (green algae)): 6.500 - 13.000 mg/l End point: Growth rate Exposure time: 7 d Test Type: static test Analytical monitoring: no data available Method: EPA GLP: No information available.
Toxicity to microorganisms	:	EC20 (activated sludge, domestic): > 1.995 mg/l End point: Bacteria toxicity (respiration inhibition) Exposure time: 0,5 h Analytical monitoring: no Method: ISO 8192 GLP: no Remarks: By analogy with a product of similar composition
Toxicity to fish (Chronic toxicity)	:	Chronic Toxicity Value: 2.629 mg/l End point: Other Exposure time: 30 d Species: Fish Method: Other GLP: no Remarks: The details of the toxic effect relate to the nominal concentration.
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	NOEC: 8.590 mg/l End point: Reproduction rate Exposure time: 7 d Species: Ceriodaphnia spec. Test Type: semi-static test Analytical monitoring: yes Method: Other GLP: No information available. Remarks: The details of the toxic effect relate to the nominal concentration.

Toxicity to soil dwelling organisms	:	Remarks: The study is not necessary from a scientific perspective.
Plant toxicity	:	Remarks: The study is not necessary from a scientific perspective.
Sediment toxicity	:	Remarks: The study is not necessary from a scientific perspective.
Toxicity to terrestrial organisms	:	Remarks: The study is not necessary from a scientific perspective.

12.2 Persistence and degradability

Product:

Biodegradability	:	Result: Readily biodegradable. Biodegradation: 90 % Method: OECD Test Guideline 302B

Components:

Ethanediol:

Biodegradability	:	Test Type: aerobic Inoculum: activated sludge Concentration: 53 mg/l Result: Readily biodegradable. Biodegradation: 90 - 100 % Related to: DOC decrease Exposure time: 10 d Method: OECD Test Guideline 301A GLP: yes

Ethanediol:

Biodegradability	:	Test Type: aerobic Inoculum: activated sludge Concentration: 53 mg/l Result: Readily biodegradable. Biodegradation: 90 - 100 % Related to: DOC decrease Exposure time: 10 d Method: OECD Test Guideline 301A GLP: yes

12.3 Bioaccumulative potential

Product:

Bioaccumulation	:	Remarks: no data available

Components:

Ethanediol:

Bioaccumulation	:	Remarks: Due to the low logPow bioaccumulation is not expected

Ethanediol:

Bioaccumulation	:	Remarks: Due to the low logPow bioaccumulation is not expected

12.4 Mobility in soil

Product:

Distribution among environmental compartments	:	Remarks: no data available

Components:

Ethanediol:

Distribution among environmental compartments	:	Adsorption/Soil Medium: water - soil Koc: log Koc: 0 Method: other (calculated)

Ethanediol:

Distribution among environmental compartments	:	Adsorption/Soil Medium: water - soil Koc: log Koc: 0 Method: other (calculated)

12.5 Results of PBT and vPvB assessment

Product:

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

Components:

Ethanediol:

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

Ethanediol:

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

12.6 Other adverse effects

Product:

Additional ecological information	:	If handled correctly it causes no disturbance in treatment plants.

Determined in the undiluted form

The classification was made by the conventional (calculation) method of the CLP Regulation (EC) No 1272/2008.

Components:

Ethanediol:

Environmental fate and pathways	:	not available
Additional ecological information	:	Do not allow to enter ground water, waterways or waste water.

Ethanediol:

Environmental fate and pathways	:	not available
Additional ecological information	:	Do not allow to enter ground water, waterways or waste water.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product	:	Dispose of in accordance with local regulations.
Contaminated packaging	:	Uncontaminated packaging may be reused Packaging that cannot be cleaned should be disposed of as product waste

SECTION 14: Transport information

Section 14.1. to 14.5.

ADR	not restricted
ADN	not restricted
RID	not restricted
IATA	not restricted
IMDG	not restricted

14.6. Special precautions for user

See sections 6 to 8 of this Safety Data Sheet.

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code (International Bulk Chemicals Code)

No transport as bulk according IBC - Code.

SECTION 15: Regulatory information

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

Other regulations:

Apart from the data/regulations specified in this chapter, no further information is available concerning safety, health and environmental protection.

15.2 Chemical safety assessment

Chemical Safety Assessments (CSAs) are available for one or more of the component substances contained in this product.

SECTION 16: Other information

Full text of H-Statements

H302	:	Harmful if swallowed.
H373	:	May cause damage to organs through prolonged or repeated exposure if swallowed.

Full text of other abbreviations

Acute Tox.	:	Acute toxicity
STOT RE	:	Specific target organ toxicity - repeated exposure

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

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

Further information

Other information : Observe national and local legal requirements

Classification of the mixture:		**Classification procedure:**
Acute Tox. 4	H302	Calculation method
STOT RE 2	H373	Calculation method

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REG_EU / EN

Exposure scenario

Number	Title
ES 1	**Industrial use; Use as an intermediate** PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC15 - ERC6a Ethane-1,2-diol
ES 2	**Industrial use; Use of non-reactive processing aid at industrial site (no inclusion into or onto article)** PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC13, PROC14, PROC15 - ERC4 Ethane-1,2-diol
ES 3	**Industrial use; Distribution of substance** PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9, PROC15 - ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7 Ethane-1,2-diol
ES 4	**Industrial use; Formulation [mixing] of preparations and/or re-packaging** PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC14, PROC15 - ERC2 Ethane-1,2-diol
ES 5	**Industrial use; Use in polymer production** PROC1, PROC2, PROC3, PROC4, PROC5, PROC6, PROC8a, PROC8b, PROC9, PROC15 - ERC6c Ethane-1,2-diol
ES 6	**Industrial use; Coatings and paints, thinners, paint removers** PROC1, PROC2, PROC3, PROC4, PROC5, PROC7, PROC8a, PROC8b, PROC10, PROC13, PROC15 - ERC4 Ethane-1,2-diol
ES 7	**Professional use; Coatings and paints, thinners, paint removers, Adhesives, sealants, Foaming, Use in polymer processing** PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC10, PROC11, PROC13, PROC14, PROC15, PROC19 - ERC8a, ERC8c, ERC8d, ERC8f Ethane-1,2-diol
ES 8	**Consumer use; Coatings and paints, thinners, paint removers, Surface treatment** PC9a, PC15, PC18, PC31, PC24, PC34 - ERC8a, ERC8c, ERC8d, ERC8f Ethane-1,2-diol
ES 9	**Industrial use; Use in cleaning agents** PROC1, PROC2, PROC3, PROC4, PROC7, PROC8a, PROC8b, PROC10, PROC13 - ERC4 Ethane-1,2-diol
ES 10	**Professional use; Use in cleaning agents**

	PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC10, PROC11, PROC13 - ERC8a, ERC8d Ethane-1,2-diol
ES 11	**Consumer use; Use in cleaning agents** PC35 - ERC8a, ERC8d Ethane-1,2-diol
ES 12	**Industrial use; Use in lubricants** PROC1, PROC2, PROC3, PROC4, PROC5, PROC7, PROC8a, PROC8b, PROC9, PROC10, PROC13, PROC17, PROC18 - ERC4, ERC7 Ethane-1,2-diol
ES 13	**Industrial use; Metal working fluids** PROC1, PROC2, PROC3, PROC4, PROC5, PROC7, PROC8a, PROC8b, PROC9, PROC10, PROC13, PROC17 - ERC4 Ethane-1,2-diol
ES 14	**Professional use; Metal working fluids** PROC1, PROC2, PROC3, PROC5, PROC8a, PROC8b, PROC9, PROC10, PROC11, PROC13, PROC17 - ERC8a, ERC8d Ethane-1,2-diol
ES 15	**Professional use; Use in agrochemicals** PROC1, PROC2, PROC4, PROC8a, PROC8b, PROC9, PROC11, PROC13 - ERC8a, ERC8d Ethane-1,2-diol
ES 16	**Industrial use; Use in functional fluids** PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9 - ERC7 Ethane-1,2-diol
ES 17	**Professional use; Use in functional fluids** PROC1, PROC2, PROC3, PROC4, PROC8a, PROC9, PROC20 - ERC9a, ERC9b Ethane-1,2-diol
ES 18	**Consumer use; Heat transfer fluids, Hydraulic fluids** PC16, PC17 - ERC9a, ERC9b Ethane-1,2-diol
ES 19	**Professional use; Anti-freeze and de-icing products** PROC1, PROC2, PROC8a, PROC8b, PROC11 - ERC8d Ethane-1,2-diol
ES 20	**Consumer use; Anti-freeze and de-icing products** PC4 - ERC8d Ethane-1,2-diol
ES 21	**Industrial use, Professional use; Use in laboratories** PROC15 - ERC8a Ethane-1,2-diol
ES 22	**Industrial use; Use in water treatment agents**

	PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC13 - ERC3, ERC4 Ethane-1,2-diol
ES 23	**Consumer use; Adhesives, sealants** PC1 - ERC8c, ERC8f Ethane-1,2-diol
ES 24	**Industrial use; Manufacture of substance, Adhesives, sealants, Foaming, Use in coatings, Use in polymer production** PROC1, PROC2, PROC3, PROC4, PROC5, PROC7, PROC8a, PROC8b, PROC9, PROC10, PROC13, PROC14, PROC15 - ERC2, ERC3, ERC5, ERC6c Ethane-1,2-diol
ES 25	**Consumer use; Insulation foams** PC32 - ERC8c, ERC8f Ethane-1,2-diol

1. ES 1: Industrial use; Use as an intermediate

1.1. Title section

Environment		
CS1:	Industrial use (Use of intermediate)	ERC6a
Workers		
CS2:	Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	PROC1
CS3:	Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	PROC2
CS4:	Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises)	PROC3, PROC4
CS5:	Industrial use (Mixing or blending in batch processes)	PROC5
CS6:	Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS7:	Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	PROC8b, PROC9
CS8:	Industrial use (Use as laboratory reagent)	PROC15

1.2. ES 1 Conditions of use affecting exposure

1.2.1 ES 1 - CS 1: Control of environmental exposure: Industrial use (Use of intermediate) (ERC6a)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

1.2.2 ES 1 - CS 2: Control of worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Product characteristics

Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use

Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management

Dermal exposure : Palm of one hand
Covers skin contact area up to : 240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor use

Risk Management Measures

Technical conditions and measures : Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

1.2.3 ES 1 - CS 3: Control of worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Product characteristics

Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use

Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

1.2.4 ES 1 - CS 4: Control of worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²
Remarks	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Remarks	:	Chemical production where opportunity for exposure arises

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Note	:	Chemical production where opportunity for exposure arises No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

1.2.5 ES 1 - CS 5: Control of worker exposure: Industrial use (Mixing or blending in batch processes) (PROC5)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	Dermal
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

1.2.6 ES 1 - CS 6: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.

Covers skin contact area up to : 960 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : inhalative
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 90 %
Personal protective measures : If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

1.2.7 ES 1 - CS 7: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

1.2.8 ES 1 - CS 8: Control of worker exposure: Industrial use (Use as laboratory reagent) (PROC15)

Product characteristics
Concentration of the Substance in : <= 100 %

Mixture/Article

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Amount used
Storage : < 1 kg, < 1 l

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 240 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : Use as laboratory reagent
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

1.3. ES 1 Exposure estimation and reference to its source

1.3.2 ES 1 - CS 2: Worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,004

1.3.3 ES 1 - CS 3: Worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,08

1.3.4 ES 1 - CS 4: Worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	7,76 mg/m³ (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,003
combined routes	ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,06
combined routes	ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises	0,43

1.3.5 ES 1 - CS 5: Worker exposure: Industrial use (Mixing or blending in batch processes) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,38

1.3.6 ES 1 - CS 6: Worker exposure: Industrial use (Transfer of substance or mixture

(charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,20

1.3.7 ES 1 - CS 7: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities	0,43
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	0,43

1.3.8 ES 1 - CS 8: Worker exposure: Industrial use (Use as laboratory reagent) (PROC15)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,37

1.4. ES 1 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

2. ES 2: Industrial use; Use of non-reactive processing aid at industrial site (no inclusion into or onto article)

2.1. Title section

Environment		
CS1:	Industrial use (Use of non-reactive processing aid at industrial site (no inclusion into or onto article))	ERC4
Workers		
CS2:	Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	PROC1
CS3:	Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	PROC2
CS4:	Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises)	PROC3, PROC4
CS5:	Industrial use (Mixing or blending in batch processes)	PROC5
CS6:	Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS7:	Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	PROC8b, PROC9
CS8:	Industrial use (Treatment of articles by dipping and pouring)	PROC13
CS9:	Industrial use (Tabletting, compression, extrusion, pelettisation, granulation)	PROC14
CS10:	Industrial use (Use as laboratory reagent)	PROC15

2.2. ES 2 Conditions of use affecting exposure

2.2.1 ES 2 - CS 1: Control of environmental exposure: Industrial use (Use of non-reactive processing aid at industrial site (no inclusion into or onto article)) (ERC4)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

2.2.2 ES 2 - CS 2: Control of worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent

containment conditions) (PROC1)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

2.2.3 ES 2 - CS 3: Control of worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

2.2.4 ES 2 - CS 4: Control of worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²
Remarks	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Remarks	:	Chemical production where opportunity for exposure arises

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Note	:	Chemical production where opportunity for exposure arises No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

2.2.5 ES 2 - CS 5: Control of worker exposure: Industrial use (Mixing or blending in batch processes) (PROC5)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	Dermal
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

2.2.6 ES 2 - CS 6: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	inhalative

Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	90 %
Personal protective measures	:	If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

2.2.7 ES 2 - CS 7: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm^2

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

2.2.8 ES 2 - CS 8: Control of worker exposure: Industrial use (Treatment of articles by dipping and pouring) (PROC13)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min

Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : Dermal
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

2.2.9 ES 2 - CS 9: Control of worker exposure: Industrial use (Tabletting, compression, extrusion, pelettisation, granulation) (PROC14)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

2.2.10 ES 2 - CS 10: Control of worker exposure: Industrial use (Use as laboratory reagent) (PROC15)

Product characteristics
Concentration of the Substance in : <= 100 %

Mixture/Article

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Amount used
Storage : < 1 kg, < 1 l

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 240 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : Use as laboratory reagent
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

2.3. ES 2 Exposure estimation and reference to its source

2.3.2 ES 2 - CS 2: Worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,004

2.3.3 ES 2 - CS 3: Worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,08

2.3.4 ES 2 - CS 4: Worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	7,76 mg/m³ (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,003
combined routes	ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,06
combined routes	ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises	0,43

2.3.5 ES 2 - CS 5: Worker exposure: Industrial use (Mixing or blending in batch processes) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,38

2.3.6 ES 2 - CS 6: Worker exposure: Industrial use (Transfer of substance or mixture

(charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,20

2.3.7 ES 2 - CS 7: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities	0,43
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	0,43

2.3.8 ES 2 - CS 8: Worker exposure: Industrial use (Treatment of articles by dipping and pouring) (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,87 mg/m³ (ECETOC TRA worker v2.0)	0,74
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,75

2.3.9 ES 2 - CS 9: Worker exposure: Industrial use (Tabletting, compression, extrusion, pelettisation, granulation) (PROC14)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	3,43 mg/kg bw/day (ECETOC TRA worker v2.0)	0,03
combined routes	ECETOC TRA worker v2.0	0,40

2.3.10 ES 2 - CS 10: Worker exposure: Industrial use (Use as laboratory reagent) (PROC15)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,37

2.4. ES 2 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

3. ES 3: Industrial use; Distribution of substance

3.1. Title section

Environment		
CS1:	Industrial use (Manufacture of the substance, Formulation into mixture, Formulation into solid matrix, Use of non-reactive processing aid at industrial site (no inclusion into or onto article), Use at industrial site leading to inclusion into/onto article, Use of intermediate, Use of reactive processing aid at industrial site (no inclusion into or onto article), Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article), Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article), Use of functional fluid at industrial site)	ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7
Workers		
CS2:	Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	PROC1
CS3:	Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with	PROC2

	equivalent containment conditions)	
CS4:	Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises)	PROC3, PROC4
CS5:	Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS6:	Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	PROC8b, PROC9
CS7:	Industrial use (Use as laboratory reagent)	PROC15

3.2. ES 3 Conditions of use affecting exposure

3.2.1 ES 3 - CS 1: Control of environmental exposure: Industrial use (Manufacture of the substance, Formulation into mixture, Formulation into solid matrix, Use of non-reactive processing aid at industrial site (no inclusion into or onto article), Use at industrial site leading to inclusion into/onto article, Use of intermediate, Use of reactive processing aid at industrial site (no inclusion into or onto article), Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article), Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article), Use of functional fluid at industrial site) (ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

3.2.2 ES 3 - CS 2: Control of worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Product characteristics

Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use

Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management

Dermal exposure : Palm of one hand
Covers skin contact area up to : 240 cm^2

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor use

Risk Management Measures
Technical conditions and measures : Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

3.2.3 ES 3 - CS 3: Control of worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm^2

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

3.2.4 ES 3 - CS 4: Control of worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²
Remarks	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Remarks	:	Chemical production where opportunity for exposure arises

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Note	:	Chemical production where opportunity for exposure arises No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

3.2.5 ES 3 - CS 5: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	inhalative
Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	90 %
Personal protective measures	:	If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

3.2.6 ES 3 - CS 6: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

3.2.7 ES 3 - CS 7: Control of worker exposure: Industrial use (Use as laboratory reagent) (PROC15)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Amount used
Storage : < 1 kg, < 1 l

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 240 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : Use as laboratory reagent
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

3.3. ES 3 Exposure estimation and reference to its source

3.3.2 ES 3 - CS 2: Worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,004

3.3.3 ES 3 - CS 3: Worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term -	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01

systemic		
combined routes	ECETOC TRA worker v2.0	0,08

3.3.4 ES 3 - CS 4: Worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	7,76 mg/m³ (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,003
combined routes	ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,06
combined routes	ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises	0,43

3.3.5 ES 3 - CS 5: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,20

3.3.6 ES 3 - CS 6: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Route of exposure and type	Exposure estimate	RCR

of effects		
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities	0,43
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	0,43

3.3.7 ES 3 - CS 7: Worker exposure: Industrial use (Use as laboratory reagent) (PROC15)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,37

3.4. ES 3 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

4. ES 4: Industrial use; Formulation [mixing] of preparations and/or re-packaging

4.1. Title section

Environment	
CS1: Industrial use (Formulation into mixture)	ERC2
Workers	

CS2:	Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	PROC1
CS3:	Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	PROC2
CS4:	Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises)	PROC3, PROC4
CS5:	Industrial use (Mixing or blending in batch processes)	PROC5
CS6:	Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS7:	Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	PROC8b, PROC9
CS8:	Industrial use (Tabletting, compression, extrusion, pelettisation, granulation)	PROC14
CS9:	Industrial use (Use as laboratory reagent)	PROC15

4.2. ES 4 Conditions of use affecting exposure

4.2.1 ES 4 - CS 1: Control of environmental exposure: Industrial use (Formulation into mixture) (ERC2)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

4.2.2 ES 4 - CS 2: Control of worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Product characteristics

Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use

Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management

Dermal exposure : Palm of one hand
Covers skin contact area up to : 240 cm^2

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor use

Risk Management Measures
Technical conditions and measures : Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

4.2.3 ES 4 - CS 3: Control of worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm^2

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

4.2.4 ES 4 - CS 4: Control of worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²
Remarks	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Remarks	:	Chemical production where opportunity for exposure arises

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Note	:	Chemical production where opportunity for exposure arises No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

4.2.5 ES 4 - CS 5: Control of worker exposure: Industrial use (Mixing or blending in batch processes) (PROC5)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	Dermal
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

4.2.6 ES 4 - CS 6: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm^2

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	inhalative
Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	90 %
Personal protective measures	:	If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

4.2.7 ES 4 - CS 7: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

4.2.8 ES 4 - CS 8: Control of worker exposure: Industrial use (Tabletting, compression, extrusion, pelettisation, granulation) (PROC14)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

4.2.9 ES 4 - CS 9: Control of worker exposure: Industrial use (Use as laboratory reagent) (PROC15)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Amount used
Storage : < 1 kg, < 1 l

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 240 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : Use as laboratory reagent
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

4.3. ES 4 Exposure estimation and reference to its source

4.3.2 ES 4 - CS 2: Worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,004

4.3.3 ES 4 - CS 3: Worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,08

4.3.4 ES 4 - CS 4: Worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	7,76 mg/m³ (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,003
combined routes	ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,06
combined routes	ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises	0,43

4.3.5 ES 4 - CS 5: Worker exposure: Industrial use (Mixing or blending in batch processes) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,38

4.3.6 ES 4 - CS 6: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,20

4.3.7 ES 4 - CS 7: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities	0,43
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	0,43

4.3.8 ES 4 - CS 8: Worker exposure: Industrial use (Tabletting, compression, extrusion, pelettisation, granulation) (PROC14)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	3,43 mg/kg bw/day (ECETOC TRA worker v2.0)	0,03
combined routes	ECETOC TRA worker v2.0	0,40

4.3.9 ES 4 - CS 9: Worker exposure: Industrial use (Use as laboratory reagent)

(PROC15)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,37

4.4. ES 4 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

5. ES 5: Industrial use; Use in polymer production

5.1. Title section

Environment		
CS1:	Industrial use (Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article))	ERC6c
Workers		
CS2:	Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	PROC1
CS3:	Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	PROC2
CS4:	Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises)	PROC3, PROC4
CS5:	Industrial use (Mixing or blending in batch processes)	PROC5
CS6:	Industrial use (Calendering operations)	PROC6
CS7:	Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS8:	Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	PROC8b, PROC9
CS9:	Industrial use (Use as laboratory reagent)	PROC15

5.2. ES 5 Conditions of use affecting exposure

5.2.1 ES 5 - CS 1: Control of environmental exposure: Industrial use (Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article)) (ERC6c)

Remarks	:	As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

5.2.2 ES 5 - CS 2: Control of worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

5.2.3 ES 5 - CS 3: Control of worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

5.2.4 ES 5 - CS 4: Control of worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²
Remarks	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Remarks	:	Chemical production where opportunity for exposure arises

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Note	:	Chemical production where opportunity for exposure arises No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

5.2.5 ES 5 - CS 5: Control of worker exposure: Industrial use (Mixing or blending in batch processes) (PROC5)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm^2

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	Dermal
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

5.2.6 ES 5 - CS 6: Control of worker exposure: Industrial use (Calendering operations) (PROC6)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	Dermal
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

5.2.7 ES 5 - CS 7: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	inhalative
Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	90 %
Personal protective measures	:	If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

5.2.8 ES 5 - CS 8: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

5.2.9 ES 5 - CS 9: Control of worker exposure: Industrial use (Use as laboratory reagent) (PROC15)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Amount used

Storage	:	< 1 kg, < 1 l

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor use

Risk Management Measures
Note : Use as laboratory reagent
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

5.3. ES 5 Exposure estimation and reference to its source

5.3.2 ES 5 - CS 2: Worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,004

5.3.3 ES 5 - CS 3: Worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,08

5.3.4 ES 5 - CS 4: Worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term	7,76 mg/m³ (ECETOC TRA worker v2.0, Manufacture or	0,22

- local and systemic	formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,003
combined routes	ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,06
combined routes	ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises	0,43

5.3.5 ES 5 - CS 5: Worker exposure: Industrial use (Mixing or blending in batch processes) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,38

5.3.6 ES 5 - CS 6: Worker exposure: Industrial use (Calendering operations) (PROC6)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA worker v2.0)	0,03
combined routes	ECETOC TRA worker v2.0	0,40

5.3.7 ES 5 - CS 7: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07

Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,20

5.3.8 ES 5 - CS 8: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities	0,43
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	0,43

5.3.9 ES 5 - CS 9: Worker exposure: Industrial use (Use as laboratory reagent) (PROC15)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,37

5.4. ES 5 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

6. ES 6: Industrial use; Coatings and paints, thinners, paint

removers

6.1. Title section

Environment		
CS1:	Industrial use (Use of non-reactive processing aid at industrial site (no inclusion into or onto article))	ERC4
Workers		
CS2:	Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	PROC1
CS3:	Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	PROC2
CS4:	Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises)	PROC3, PROC4
CS5:	Industrial use (Mixing or blending in batch processes)	PROC5
CS6:	Industrial use (Industrial spraying)	PROC7
CS7:	Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS8:	Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities)	PROC8b
CS9:	Industrial use (Roller application or brushing)	PROC10
CS10:	Industrial use (Treatment of articles by dipping and pouring)	PROC13
CS11:	Industrial use (Use as laboratory reagent)	PROC15

6.2. ES 6 Conditions of use affecting exposure

6.2.1 ES 6 - CS 1: Control of environmental exposure: Industrial use (Use of non-reactive processing aid at industrial site (no inclusion into or onto article)) (ERC4)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

6.2.2 ES 6 - CS 2: Control of worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Product characteristics

Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Palm of one hand
Covers skin contact area up to : 240 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Technical conditions and measures : Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

6.2.3 ES 6 - CS 3: Control of worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

6.2.4 ES 6 - CS 4: Control of worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²
Remarks	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Remarks	:	Chemical production where opportunity for exposure arises

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Note	:	Chemical production where opportunity for exposure arises No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

6.2.5 ES 6 - CS 5: Control of worker exposure: Industrial use (Mixing or blending in batch processes) (PROC5)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm^2

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	Dermal
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

6.2.6 ES 6 - CS 6: Control of worker exposure: Industrial use (Industrial spraying) (PROC7)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Amount used

Amounts used	:	0,6 L/min

Frequency and duration of use

Exposure duration	:	360 min
Frequency of use	:	<= 5 days per week

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	> 1000 m3

Risk Management Measures

Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	50 %
Note	:	Ensure that the direction of airflow is clearly away from the worker.
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %

Personal protective measures	:	Wear suitable protective clothing. Wear suitable coveralls to prevent exposure to the skin.
Effectiveness (of a measure)	:	80 %
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the distance from worker to task is greater than 1 m.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that direction of application is only horizontal or downward.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of work area
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of equipment
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure regular inspection, cleaning and maintenance of equipment and machines.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

6.2.7 ES 6 - CS 7: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	inhalative
Technical conditions and measures	:	Local exhaust ventilation

Effectiveness (of a measure)	:	90 %
Personal protective measures	:	If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

6.2.8 ES 6 - CS 8: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities) (PROC8b)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm^2

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	Transfer of substance or mixture (charging/discharging) at dedicated facilities No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

6.2.9 ES 6 - CS 9: Control of worker exposure: Industrial use (Roller application or brushing) (PROC10)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure : Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to : 960 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : Dermal
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

6.2.10 ES 6 - CS 10: Control of worker exposure: Industrial use (Treatment of articles by dipping and pouring) (PROC13)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : Dermal
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

6.2.11 ES 6 - CS 11: Control of worker exposure: Industrial use (Use as laboratory reagent) (PROC15)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Amount used
Storage : < 1 kg, < 1 l

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 240 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : Use as laboratory reagent
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

6.3. ES 6 Exposure estimation and reference to its source

6.3.2 ES 6 - CS 2: Worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,004

6.3.3 ES 6 - CS 3: Worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Route of exposure and type	Exposure estimate	RCR

of effects		
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,08

6.3.4 ES 6 - CS 4: Worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	7,76 mg/m³ (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,003
combined routes	ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,06
combined routes	ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises	0,43

6.3.5 ES 6 - CS 5: Worker exposure: Industrial use (Mixing or blending in batch processes) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,38

6.3.6 ES 6 - CS 6: Worker exposure: Industrial use (Industrial spraying) (PROC7)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	9,79 mg/m³ (Stoffenmanager v4.0)	0,28
Worker - dermal, long-term - systemic	54,6 mg/kg bw/day (RISKOFDERM v2.1)	0,52
combined routes	Not applicable	0,80

6.3.7 ES 6 - CS 7: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,20

6.3.8 ES 6 - CS 8: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities) (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0)	0,06
combined routes	ECETOC TRA worker v2.0	0,43

6.3.9 ES 6 - CS 9: Worker exposure: Industrial use (Roller application or brushing) (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,87 mg/m³ (ECETOC TRA worker v2.0)	0,74
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA worker v2.0)	0,03
combined routes	ECETOC TRA worker v2.0	0,77

6.3.10 ES 6 - CS 10: Worker exposure: Industrial use (Treatment of articles by dipping and pouring) (PROC13)

Route of exposure and type	Exposure estimate	RCR

of effects		
Worker - inhalative, long-term - local and systemic	25,87 mg/m³ (ECETOC TRA worker v2.0)	0,74
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,75

6.3.11 ES 6 - CS 11: Worker exposure: Industrial use (Use as laboratory reagent) (PROC15)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,37

6.4. ES 6 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

7. ES 7: Professional use; Coatings and paints, thinners, paint removers, Adhesives, sealants, Foaming, Use in polymer processing

7.1. Title section

Environment		
CS1:	Professional use (Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor), Widespread use leading to inclusion into/onto article (indoor), Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor), Widespread use leading to inclusion into/onto article (outdoor))	ERC8a, ERC8c, ERC8d, ERC8f
Workers		
CS2:	Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	PROC1, PROC2, PROC3

CS3:	Professional use (Chemical production where opportunity for exposure arises, Mixing or blending in batch processes)	PROC4, PROC5
CS4:	Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS5:	Professional use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	PROC8b, PROC9
CS6:	Professional use (Roller application or brushing)	PROC10
CS7:	Professional use (Non-industrial spraying)	PROC11
CS8:	Professional use (Treatment of articles by dipping and pouring, Tabletting, compression, extrusion, pelettisation, granulation)	PROC13, PROC14
CS9:	Professional use (Use as laboratory reagent)	PROC15
CS10:	Professional use (Manual activities involving hand contact)	PROC19

7.2. ES 7 Conditions of use affecting exposure

7.2.1 ES 7 - CS 1: Control of environmental exposure: Professional use (Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor), Widespread use leading to inclusion into/onto article (indoor), Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor), Widespread use leading to inclusion into/onto article (outdoor)) (ERC8a, ERC8c, ERC8d, ERC8f)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

7.2.2 ES 7 - CS 2: Control of worker exposure: Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition) (PROC1, PROC2, PROC3)

Product characteristics

Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use

Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management

Dermal exposure : Palm of one hand
Covers skin contact area up to : 240 cm²

Remarks	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Remarks	:	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions Sample via a closed loop or other system to avoid exposure.
Technical conditions and measures	:	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
Technical conditions and measures	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition With occasional controlled exposure

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

7.2.3 ES 7 - CS 3: Control of worker exposure: Professional use (Chemical production where opportunity for exposure arises, Mixing or blending in batch processes) (PROC4, PROC5)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

7.2.4 ES 7 - CS 4: Control of worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to : 960 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : inhalative
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 80 %
Personal protective measures : If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure) : 80 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

7.2.5 ES 7 - CS 5: Control of worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

7.2.6 ES 7 - CS 6: Control of worker exposure: Professional use (Roller application or brushing) (PROC10)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to : 960 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : Dermal
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure) : 90 %

Exposure routes : inhalative
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 80 %

Personal protective measures	:	If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure)	:	80 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

7.2.7 ES 7 - CS 7: Control of worker exposure: Professional use (Non-industrial spraying) (PROC11)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Amount used

Amounts used	:	0,05 L/min

Frequency and duration of use

Exposure duration	:	150 min
Frequency of use	:	<= 5 days per week

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	<= 1000 m3

Risk Management Measures

Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %
Personal protective measures	:	Wear suitable protective clothing. Wear suitable coveralls to prevent exposure to the skin.
Effectiveness (of a measure)	:	80 %
Personal protective measures	:	Wear a respirator conforming to EN140.
Effectiveness (of a measure)	:	40 %
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that direction of application is only horizontal or downward.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the distance from worker to task is greater than 1 m.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the direction of airflow is clearly away from the worker.
Note	:	Not applicable

Organisational measures to prevent /limit releases, dispersion and exposure	:	Provide enhanced general ventilation by mechanical means.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of work area
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of equipment
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure regular inspection, cleaning and maintenance of equipment and machines.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the task is not carried out by more than one worker simultaneously.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

7.2.8 ES 7 - CS 8: Control of worker exposure: Professional use (Treatment of articles by dipping and pouring, Tabletting, compression, extrusion, pelettisation, granulation) (PROC13, PROC14)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %
Note	:	Treatment of articles by dipping and pouring

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

7.2.9 ES 7 - CS 9: Control of worker exposure: Professional use (Use as laboratory reagent) (PROC15)

Product characteristics

Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Amount used

Storage : < 1 kg, < 1 l

Frequency and duration of use

Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management

Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor use

Risk Management Measures

Note : Use as laboratory reagent
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

7.2.10 ES 7 - CS 10: Control of worker exposure: Professional use (Manual activities involving hand contact) (PROC19)

Product characteristics

Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use

Exposure duration : < 15 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management

Dermal exposure : Assumes that potential dermal contact is limited to hands and forearms.
Covers skin contact area up to : 1980 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

7.3. ES 7 Exposure estimation and reference to its source

7.3.2 ES 7 - CS 2: Worker exposure: Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition) (PROC1, PROC2, PROC3)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	0,003
combined routes	ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	0,004
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	0,01
combined routes	ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	0,38
Worker - inhalative, long-term	7,76 mg/m³ (ECETOC TRA worker v2.0, Manufacture or	0,22

- local and systemic	formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,003
combined routes	ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	0,23

7.3.3 ES 7 - CS 3: Worker exposure: Professional use (Chemical production where opportunity for exposure arises, Mixing or blending in batch processes) (PROC4, PROC5)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,06
combined routes	ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises	0,80
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0, Mixing or blending in batch processes)	0,74
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0, Mixing or blending in batch processes)	0,01
combined routes	ECETOC TRA worker v2.0, Mixing or blending in batch processes	0,75

7.3.4 ES 7 - CS 4: Worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,50

7.3.5 ES 7 - CS 5: Worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities	0,80
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	0,80

7.3.6 ES 7 - CS 6: Worker exposure: Professional use (Roller application or brushing) (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA worker v2.0)	0,03
combined routes	ECETOC TRA worker v2.0	0,40

7.3.7 ES 7 - CS 7: Worker exposure: Professional use (Non-industrial spraying) (PROC11)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	14,05 mg/m³ (Stoffenmanager v4.0)	0,40
Worker - dermal, long-term - systemic	53,75 mg/kg bw/day (RISKOFDERM v2.1)	0,51
combined routes	Not applicable	0,91

7.3.8 ES 7 - CS 8: Worker exposure: Professional use (Treatment of articles by dipping and pouring, Tabletting, compression, extrusion, pelettisation, granulation) (PROC13, PROC14)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0, Treatment of articles by dipping and pouring)	0,74
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0, Treatment of articles by dipping and pouring)	0,01
combined routes	ECETOC TRA worker v2.0, Treatment of articles by dipping and pouring	0,75
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0, Tabletting, compression, extrusion, pelettisation, granulation)	0,74
Worker - dermal, long-term - systemic	3,43 mg/kg bw/day (ECETOC TRA worker v2.0, Tabletting, compression, extrusion, pelettisation, granulation)	0,03
combined routes	ECETOC TRA worker v2.0, Tabletting, compression, extrusion, pelettisation, granulation	0,77

7.3.9 ES 7 - CS 9: Worker exposure: Professional use (Use as laboratory reagent) (PROC15)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,37

7.3.10 ES 7 - CS 10: Worker exposure: Professional use (Manual activities involving hand contact) (PROC19)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	6,47 mg/m³ (ECETOC TRA worker v2.0)	0,18
Worker - dermal, long-term - systemic	14,14 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,31

7.4. ES 7 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

8. ES 8: Consumer use; Coatings and paints, thinners, paint removers, Surface treatment

8.1. Title section

Coatings and paints, thinners, paint removers (PC9a) Non-metal surface treatment products (PC15) Ink and toners (PC18) Polishes and wax blends (PC31) Lubricants, greases, release products (PC24) Textile dyes and impregnating products (PC34)		
Environment		
CS1:	Consumer use (Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor), Widespread use leading to inclusion into/onto article (indoor), Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor), Widespread use leading to inclusion into/onto article (outdoor))	ERC8a, ERC8c, ERC8d, ERC8f
Consumer		
CS2:	Consumer use (Coatings and paints, thinners, paint removers, Non-metal surface treatment products)	PC9a, PC15
CS3:	Consumer use (Coatings and paints, thinners, paint removers, Non-metal surface treatment products)	PC9a, PC15
CS4:	Consumer use (Ink and toners)	PC18
CS5:	Consumer use (Ink and toners)	PC18
CS6:	Consumer use (Polishes and wax blends)	PC31

8.2. ES 8 Conditions of use affecting exposure

8.2.1 ES 8 - CS 1: Control of environmental exposure: Consumer use (Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor), Widespread use leading to inclusion into/onto article (indoor), Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor), Widespread use leading to inclusion into/onto article (outdoor)) (ERC8a, ERC8c, ERC8d, ERC8f)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

8.2.2 ES 8 - CS 2: Control of consumer exposure: Consumer use (Coatings and paints, thinners, paint removers, Non-metal surface treatment products) (PC9a, PC15)

Remarks : Waterborne paint
Rolling, Brushing
No spraying

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 5 %
Molecular weight	:	45 g/mol
Physical Form (at time of use)	:	Liquid
Vapour pressure	:	0,123 hPa

Amount used

Amounts used	:	1,25 kg/day

Frequency and duration of use

Application duration	:	120 min
Frequency of use	:	1 days per year
Exposure duration	:	132 min

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands and forearms.
Covers skin contact area up to	:	1900 cm²
Dermal	:	0,00003 kg/min

Other given operational conditions affecting consumers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	20 m3
Temperature	:	25 °C
Ventilation rate per hour	:	0,6
Mass transfer rate	:	0,331 m/min
Release area	:	10 m2

Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)

Consumer Measures	:	No specific measures identified.

8.2.3 ES 8 - CS 3: Control of consumer exposure: Consumer use (Coatings and paints, thinners, paint removers, Non-metal surface treatment products) (PC9a, PC15)

Remarks	:	Spraying

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 5 %
Physical Form (at time of use)	:	Liquid
Vapour pressure	:	0,123 hPa

Amount used

Amounts used	:	0,0198 kg/min

Frequency and duration of use

Application duration	:	15 min
Frequency of use	:	2 days per year
Exposure duration	:	15 min

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands and forearms.
Covers skin contact area up to	:	1900 cm²
Dermal	:	0,0001 kg/min
Uptake fraction, Oral	:	100 %

Other given operational conditions affecting consumers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	34 m3
Temperature	:	25 °C
Ventilation rate per hour	:	1,5
Room height	:	2,25 m
Weight percent	:	30 %
Remarks	:	Non-Volatile
Density	:	1,5 g/cm3
Remarks	:	Non-Volatile
Airborne fraction	:	100 %
Remarks	:	Non-Volatile
Inhalation cut-off diameter	:	0,015 mm

Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)

Consumer Measures	:	Ensure spraying away from persons.

8.2.4 ES 8 - CS 4: Control of consumer exposure: Consumer use (Ink and toners) (PC18)

Remarks	:	Refilling

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 5 %
Molecular weight	:	22 g/mol
Physical Form (at time of use)	:	Liquid
Vapour pressure	:	0,123 hPa

Amount used

Amount per use	:	0,05 kg

Frequency and duration of use

Application duration	:	0,3 min
Frequency of use	:	104 days per year
Exposure duration	:	0,75 min

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	215 cm²

Other given operational conditions affecting consumers exposure

Outdoor / Indoor	:	Indoor use
Temperature	:	25 °C
Ventilation rate per hour	:	0,5
Mass transfer rate	:	0,331 m/min
Release area	:	20 cm²

Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)

Consumer Measures	:	No specific measures identified.

8.2.5 ES 8 - CS 5: Control of consumer exposure: Consumer use (Ink and toners) (PC18)

Remarks	:	Printing process

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 5 %
Physical Form (at time of use)	:	Liquid
Vapour pressure	:	0,123 hPa

Amount used

: 0,016 kg/day

Frequency and duration of use

Exposure duration	:	600 min
Frequency of use	:	365 days per year

Other given operational conditions affecting consumers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	25 m3
Temperature	:	25 °C
Ventilation rate per hour	:	0,6

Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)

Consumer Measures	:	No specific measures identified.

8.2.6 ES 8 - CS 6: Control of consumer exposure: Consumer use (Polishes and wax blends) (PC31)

Remarks	:	No spraying

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 2,5 %
Molecular weight	:	272 g/mol
Physical Form (at time of use)	:	Liquid
Vapour pressure	:	0,123 hPa

Amount used

: 0,55 kg/day

Frequency and duration of use

Application duration	: 900 min
Frequency of use	: 1 days per year
Release duration	: 120 min
Exposure duration	: 240 min

Human factors not influenced by risk management

Dermal exposure	: Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	: 430 cm²
Dermal	: 0,00003 kg/min

Other given operational conditions affecting consumers exposure

Outdoor / Indoor	: Indoor use
Room size	: 58 m3
Temperature	: 25 °C
Ventilation rate per hour	: 0,5
Mass transfer rate	: 4740 m/min
Release area	: 22 m2

Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)

Consumer Measures	: No specific measures identified.

8.3. ES 8 Exposure estimation and reference to its source

8.3.2 ES 8 - CS 2: Consumer exposure: Consumer use (Coatings and paints, thinners, paint removers, Non-metal surface treatment products) (PC9a, PC15)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	0,72 mg/m³ (Consexpo V4.1)	0,10
Chronic dermal systemic exposure	2,77 mg/kg bw/day (Consexpo V4.1)	0,05
Consumer - oral, long-term - systemic	Consexpo V4.1, Not applicable	
combined routes	Consexpo V4.1	0,15

8.3.3 ES 8 - CS 3: Consumer exposure: Consumer use (Coatings and paints, thinners, paint removers, Non-metal surface treatment products) (PC9a, PC15)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	0,26 mg/m³ (Consexpo V4.1)	0,04
Chronic dermal systemic exposure	1,15 mg/kg bw/day (Consexpo V4.1)	0,02
Consumer - oral, long-term - systemic	0,13 mg/kg bw/day (Consexpo V4.1, Risk management measures are based on qualitative risk characterisation.)	
combined routes	Consexpo V4.1	0,06

8.3.4 ES 8 - CS 4: Consumer exposure: Consumer use (Ink and toners) (PC18)

Route of exposure and type of effects	Exposure estimate	RCR
Chronic dermal systemic exposure	0,008 mg/kg bw/day (Consexpo V4.1)	0,0002

8.3.5 ES 8 - CS 5: Consumer exposure: Consumer use (Ink and toners) (PC18)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	1,29 mg/m³ (Consexpo V4.1)	0,18

8.3.6 ES 8 - CS 6: Consumer exposure: Consumer use (Polishes and wax blends) (PC31)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	3,93 mg/m³ (Consexpo V4.1)	0,56
Chronic dermal systemic exposure	2,12 mg/kg bw/day (Consexpo V4.1)	0,04
combined routes	Consexpo V4.1	0,60

8.4. ES 8 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

9. ES 9: Industrial use; Use in cleaning agents

9.1. Title section

Environment		
CS1:	Industrial use (Use of non-reactive processing aid at industrial site (no inclusion into or onto article))	ERC4
Workers		
CS2:	Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	PROC1
CS3:	Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	PROC2
CS4:	Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises)	PROC3, PROC4
CS5:	Industrial use (Industrial spraying)	PROC7
CS6:	Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS7:	Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities)	PROC8b
CS8:	Industrial use (Roller application or brushing)	PROC10
CS9:	Industrial use (Treatment of articles by dipping and pouring)	PROC13

9.2. ES 9 Conditions of use affecting exposure

9.2.1 ES 9 - CS 1: Control of environmental exposure: Industrial use (Use of non-reactive processing aid at industrial site (no inclusion into or onto article)) (ERC4)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

Concentration of the Substance in Mixture/Article : <= 100 %

9.2.2 ES 9 - CS 2: Control of worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Product characteristics

Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use

Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Palm of one hand
Covers skin contact area up to : 240 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Technical conditions and measures : Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

9.2.3 ES 9 - CS 3: Control of worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

9.2.4 ES 9 - CS 4: Control of worker exposure: Industrial use (Manufacture or

formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²
Remarks	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Remarks	:	Chemical production where opportunity for exposure arises

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Note	:	Chemical production where opportunity for exposure arises No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

9.2.5 ES 9 - CS 5: Control of worker exposure: Industrial use (Industrial spraying) (PROC7)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Amount used

Amounts used	:	0,6 L/min

Frequency and duration of use

Exposure duration	:	360 min
Frequency of use	:	<= 5 days per week

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	> 1000 m3

Risk Management Measures

Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	50 %
Note	:	Ensure that the direction of airflow is clearly away from the worker.
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %
Personal protective measures	:	Wear suitable protective clothing. Wear suitable coveralls to prevent exposure to the skin.
Effectiveness (of a measure)	:	80 %
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the distance from worker to task is greater than 1 m.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that direction of application is only horizontal or downward.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of work area
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of equipment
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure regular inspection, cleaning and maintenance of equipment and machines.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

9.2.6 ES 9 - CS 6: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %

Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	inhalative
Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	90 %
Personal protective measures	:	If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

9.2.7 ES 9 - CS 7: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities) (PROC8b)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	Transfer of substance or mixture (charging/discharging) at dedicated facilities No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

9.2.8 ES 9 - CS 8: Control of worker exposure: Industrial use (Roller application or brushing) (PROC10)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to : 960 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : Dermal
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

9.2.9 ES 9 - CS 9: Control of worker exposure: Industrial use (Treatment of articles by dipping and pouring) (PROC13)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : Dermal
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

9.3. ES 9 Exposure estimation and reference to its source

9.3.2 ES 9 - CS 2: Worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,004

9.3.3 ES 9 - CS 3: Worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,08

9.3.4 ES 9 - CS 4: Worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	7,76 mg/m³ (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,003
combined routes	ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,06
combined routes	ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises	0,43

9.3.5 ES 9 - CS 5: Worker exposure: Industrial use (Industrial spraying) (PROC7)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	9,79 mg/m³ (Stoffenmanager v4.0)	0,28
Worker - dermal, long-term - systemic	54,6 mg/kg bw/day (RISKOFDERM v2.1)	0,52
combined routes	Not applicable	0,80

9.3.6 ES 9 - CS 6: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,20

9.3.7 ES 9 - CS 7: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities) (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0)	0,06
combined routes	ECETOC TRA worker v2.0	0,43

9.3.8 ES 9 - CS 8: Worker exposure: Industrial use (Roller application or brushing) (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,87 mg/m³ (ECETOC TRA worker v2.0)	0,74
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA worker v2.0)	0,03
combined routes	ECETOC TRA worker v2.0	0,77

9.3.9 ES 9 - CS 9: Worker exposure: Industrial use (Treatment of articles by dipping and pouring) (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,87 mg/m³ (ECETOC TRA worker v2.0)	0,74
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,75

9.4. ES 9 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

10. ES 10: Professional use; Use in cleaning agents

10.1. Title section

Environment		
CS1:	Professional use (Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor), Widespread use of non-reactive	ERC8a, ERC8d

	processing aid (no inclusion into or onto article, outdoor))	
Workers		
CS2:	Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	PROC1, PROC2, PROC3
CS3:	Professional use (Chemical production where opportunity for exposure arises)	PROC4
CS4:	Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS5:	Professional use (Transfer of substance or mixture (charging/discharging) at dedicated facilities)	PROC8b
CS6:	Professional use (Roller application or brushing)	PROC10
CS7:	Professional use (Non-industrial spraying)	PROC11
CS8:	Professional use (Treatment of articles by dipping and pouring)	PROC13

10.2. ES 10 Conditions of use affecting exposure

10.2.1 ES 10 - CS 1: Control of environmental exposure: Professional use (Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor), Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)) (ERC8a, ERC8d)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

10.2.2 ES 10 - CS 2: Control of worker exposure: Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition) (PROC1, PROC2, PROC3)

Product characteristics

Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use

Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²
Remarks	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Remarks	:	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions Sample via a closed loop or other system to avoid exposure.
Technical conditions and measures	:	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
Technical conditions and measures	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition With occasional controlled exposure

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

10.2.3 ES 10 - CS 3: Control of worker exposure: Professional use (Chemical production where opportunity for exposure arises) (PROC4)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside

hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

10.2.4 ES 10 - CS 4: Control of worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to : 960 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : inhalative
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 80 %
Personal protective measures : If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure) : 80 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

10.2.5 ES 10 - CS 5: Control of worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at dedicated facilities) (PROC8b)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

10.2.6 ES 10 - CS 6: Control of worker exposure: Professional use (Roller application or brushing) (PROC10)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to : 960 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : inhalative
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 80 %
Personal protective measures : If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure) : 80 %

Exposure routes : Dermal

Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

10.2.7 ES 10 - CS 7: Control of worker exposure: Professional use (Non-industrial spraying) (PROC11)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Amount used

Amounts used	:	0,05 L/min

Frequency and duration of use

Exposure duration	:	150 min
Frequency of use	:	<= 5 days per week

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	<= 1000 m3

Risk Management Measures

Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %
Personal protective measures	:	Wear suitable protective clothing. Wear suitable coveralls to prevent exposure to the skin.
Effectiveness (of a measure)	:	80 %
Personal protective measures	:	Wear a respirator conforming to EN140.
Effectiveness (of a measure)	:	40 %
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that direction of application is only horizontal or downward.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the distance from worker to task is greater than 1 m.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the direction of airflow is clearly away from the worker.
Note	:	Not applicable

Organisational measures to prevent /limit releases, dispersion and exposure	:	Provide enhanced general ventilation by mechanical means.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of work area
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of equipment
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure regular inspection, cleaning and maintenance of equipment and machines.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the task is not carried out by more than one worker simultaneously.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

10.2.8 ES 10 - CS 8: Control of worker exposure: Professional use (Treatment of articles by dipping and pouring) (PROC13)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm^2

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

10.3. ES 10 Exposure estimation and reference to its source

10.3.2 ES 10 - CS 2: Worker exposure: Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition) (PROC1, PROC2, PROC3)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	0,003
combined routes	ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	0,004
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	0,01
combined routes	ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	0,38
Worker - inhalative, long-term - local and systemic	7,76 mg/m³ (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,003

combined routes	ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	0,23

10.3.3 ES 10 - CS 3: Worker exposure: Professional use (Chemical production where opportunity for exposure arises) (PROC4)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0)	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0)	0,06
combined routes	ECETOC TRA worker v2.0	0,80

10.3.4 ES 10 - CS 4: Worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,50

10.3.5 ES 10 - CS 5: Worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at dedicated facilities) (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities	0,80

10.3.6 ES 10 - CS 6: Worker exposure: Professional use (Roller application or brushing) (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR

Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA worker v2.0)	0,03
combined routes	ECETOC TRA worker v2.0	0,40

10.3.7 ES 10 - CS 7: Worker exposure: Professional use (Non-industrial spraying) (PROC11)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	14,05 mg/m³ (Stoffenmanager v4.0)	0,40
Worker - dermal, long-term - systemic	53,75 mg/kg bw/day (RISKOFDERM v2.1)	0,51
combined routes	Not applicable	0,91

10.3.8 ES 10 - CS 8: Worker exposure: Professional use (Treatment of articles by dipping and pouring) (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0, Treatment of articles by dipping and pouring)	0,74
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0, Treatment of articles by dipping and pouring)	0,01
combined routes	ECETOC TRA worker v2.0, Treatment of articles by dipping and pouring	0,75

10.4. ES 10 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

11. ES 11: Consumer use; Use in cleaning agents

11.1. Title section

Washing and cleaning products (PC35)		
Environment		
CS1:	Consumer use (Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor), Widespread use of non-reactive	ERC8a, ERC8d

	processing aid (no inclusion into or onto article, outdoor))	
Consumer		
CS2:	Consumer use (Washing and cleaning products)	PC35
CS3:	Consumer use (Washing and cleaning products)	PC35
CS4:	Consumer use (Washing and cleaning products)	PC35
CS5:	Consumer use (Washing and cleaning products)	PC35
CS6:	Consumer use (Washing and cleaning products)	PC35
CS7:	Consumer use (Washing and cleaning products)	PC35

11.2. ES 11 Conditions of use affecting exposure

11.2.1 ES 11 - CS 1: Control of environmental exposure: Consumer use (Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor), Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)) (ERC8a, ERC8d)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

11.2.2 ES 11 - CS 2: Control of consumer exposure: Consumer use (Washing and cleaning products) (PC35)

Remarks : No spraying
Default database: cleaning and washing/all purpose cleaner/liquid/mixing and loading

Product characteristics

Concentration of the Substance in Mixture/Article : <= 20 %

Molecular weight : 22 g/mol
Physical Form (at time of use) : Liquid
Vapour pressure : 0,123 hPa

Amount used

Amounts used : 0,5 kg/day

Frequency and duration of use

Application duration : 0,3 min
Frequency of use : 104 days per year
Exposure duration : 0,75 min

Human factors not influenced by risk management

Dermal exposure : Palm of one hand
Covers skin contact area up to : 215 cm^2

Other given operational conditions affecting consumers exposure

Outdoor / Indoor	:	Indoor use
Temperature	:	25 °C
Ventilation rate per hour	:	0,5
Mass transfer rate	:	4740 m/min
Release area	:	20 cm²

Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)

Consumer Measures	:	No specific measures identified.

11.2.3 ES 11 - CS 3: Control of consumer exposure: Consumer use (Washing and cleaning products) (PC35)

Remarks	:	No spraying Application

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 4 %
Molecular weight	:	18 g/mol
Physical Form (at time of use)	:	Liquid
Vapour pressure	:	0,123 hPa

Amount used

Amounts used	:	0,4 kg/day

Frequency and duration of use

Application duration	:	20 min
Frequency of use	:	104 days per year
Exposure duration	:	240 min

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	215 cm²

Other given operational conditions affecting consumers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	58 m3
Temperature	:	25 °C
Ventilation rate per hour	:	0,5
Mass transfer rate	:	4740 m/min
Release area	:	10 m2

Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)

Consumer Measures	:	No specific measures identified.

11.2.4 ES 11 - CS 4: Control of consumer exposure: Consumer use (Washing and cleaning products) (PC35)

Remarks	:	Sprays Spraying

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 5 %
Physical Form (at time of use)	:	Liquid
Vapour pressure	:	0,123 hPa

Amount used

Amounts used	:	0,0468 kg/min

Frequency and duration of use

Spray duration	:	0,41 min
Frequency of use	:	365 days per year
Exposure duration	:	60 min
Release duration	:	2,6 s

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands and forearms.
Covers skin contact area up to	:	1900 cm²
Dermal	:	0,000046 kg/min
Uptake fraction, Oral	:	100 %

Other given operational conditions affecting consumers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	15 m3
Temperature	:	25 °C
Ventilation rate per hour	:	2,5
Room height	:	2,5 m
Weight percent	:	5 %
Remarks	:	Non-Volatile
Density	:	1,8 g/cm3
Remarks	:	Non-Volatile
Airborne fraction	:	20 %
Remarks	:	Non-Volatile
Inhalation cut-off diameter	:	0,015 mm

Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)

Consumer Measures	:	Ensure spraying away from persons.

11.2.5 ES 11 - CS 5: Control of consumer exposure: Consumer use (Washing and cleaning products) (PC35)

Remarks	:	Sprays Cleaning

Product characteristics

Concentration of the Substance in	:	<= 5 %

Mixture/Article

Molecular weight	:	22 g/mol
Physical Form (at time of use)	:	Liquid
Vapour pressure	:	0,123 hPa

Amount used

Amounts used	:	0,0162 kg/day

Frequency and duration of use

Application duration	:	10 min
Frequency of use	:	365 days per year
Exposure duration	:	60 min

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	215 cm²

Other given operational conditions affecting consumers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	15 m3
Temperature	:	25 °C
Ventilation rate per hour	:	2,5
Mass transfer rate	:	4740 m/min
Release area	:	17100 cm²

Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)

Consumer Measures	:	No specific measures identified.

11.2.6 ES 11 - CS 6: Control of consumer exposure: Consumer use (Washing and cleaning products) (PC35)

Remarks	:	Floor cleaning (liquids) Mixing operations (open systems) Loading of application equipment

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 2,5 %
Molecular weight	:	22 g/mol
Physical Form (at time of use)	:	Liquid
Vapour pressure	:	0,123 hPa

Amount used

Amounts used	:	0,5 kg/day

Frequency and duration of use

Application duration	:	0,3 min
Frequency of use	:	104 days per year
Exposure duration	:	0,75 min

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	215 cm²

Other given operational conditions affecting consumers exposure

Outdoor / Indoor	:	Indoor use
Temperature	:	25 °C
Ventilation rate per hour	:	1,0
Mass transfer rate	:	4740 m/min
Release area	:	20 cm²

Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)

Consumer Measures	:	No specific measures identified.

11.2.7 ES 11 - CS 7: Control of consumer exposure: Consumer use (Washing and cleaning products) (PC35)

Remarks	:	Floor cleaning (liquids) Application

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 2,5 %
Molecular weight	:	18 g/mol
Physical Form (at time of use)	:	Liquid
Vapour pressure	:	0,123 hPa

Amount used

Amounts used	:	0,88 kg/day

Frequency and duration of use

Application duration	:	30 min
Frequency of use	:	104 days per year
Exposure duration	:	240 min

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	215 cm²

Other given operational conditions affecting consumers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	58 m3
Temperature	:	25 °C
Ventilation rate per hour	:	0,5
Mass transfer rate	:	4740 m/min
Release area	:	22 m2

Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)
Consumer Measures : No specific measures identified.

11.3. ES 11 Exposure estimation and reference to its source

11.3.2 ES 11 - CS 2: Consumer exposure: Consumer use (Washing and cleaning products) (PC35)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	0,01 mg/m³ (Consexpo V4.1)	0,001
Chronic dermal systemic exposure	0,03 mg/kg bw/day (Consexpo V4.1)	0,0006
Consumer - oral, long-term - systemic	Consexpo V4.1, Not applicable	
combined routes	Consexpo V4.1	0,002

11.3.3 ES 11 - CS 3: Consumer exposure: Consumer use (Washing and cleaning products) (PC35)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	0,61 mg/m³ (Consexpo V4.1)	0,09
Chronic dermal systemic exposure	11,70 mg/kg bw/day (Consexpo V4.1)	0,22
Consumer - oral, long-term - systemic	Consexpo V4.1, Not applicable	
combined routes	Consexpo V4.1	0,31

11.3.4 ES 11 - CS 4: Consumer exposure: Consumer use (Washing and cleaning products) (PC35)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	0,000011 mg/m³ (Consexpo V4.1)	
Chronic dermal systemic exposure	0,01 mg/kg bw/day (Consexpo V4.1)	0,0002
Consumer - oral, long-term - systemic	0,0006 mg/kg bw/day (Consexpo V4.1)	
combined routes	Consexpo V4.1	0,0002

11.3.5 ES 11 - CS 5: Consumer exposure: Consumer use (Washing and cleaning products) (PC35)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	0,11 mg/m³ (Consexpo V4.1)	0,02
Chronic dermal systemic exposure	0,12 mg/kg bw/day (Consexpo V4.1)	0,002
Consumer - oral, long-term - systemic	Consexpo V4.1, Not applicable	
combined routes	Consexpo V4.1	0,02

11.3.6 ES 11 - CS 6: Consumer exposure: Consumer use (Washing and cleaning products) (PC35)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	0,01 mg/m³ (Consexpo V4.1)	0,001
Chronic dermal systemic exposure	0,04 mg/kg bw/day (Consexpo V4.1)	0,0008
Consumer - oral, long-term - systemic	Consexpo V4.1, Not applicable	
combined routes	Consexpo V4.1	0,002

11.3.7 ES 11 - CS 7: Consumer exposure: Consumer use (Washing and cleaning products) (PC35)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	0,38 mg/m³ (Consexpo V4.1)	0,05
Chronic dermal systemic exposure	7,31 mg/kg bw/day (Consexpo V4.1)	0,14
Consumer - oral, long-term - systemic	Consexpo V4.1, Not applicable	
combined routes	Consexpo V4.1	0,19

11.4. ES 11 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

12. ES 12: Industrial use; Use in lubricants

12.1. Title section

Environment		
CS1:	Industrial use (Use of non-reactive processing aid at industrial site (no inclusion into or onto article), Use of functional fluid at industrial site)	ERC4, ERC7
Workers		
CS2:	Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	PROC1
CS3:	Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	PROC2
CS4:	Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises)	PROC3, PROC4
CS5:	Industrial use (Mixing or blending in batch processes)	PROC5
CS6:	Industrial use (Industrial spraying)	PROC7
CS7:	Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS8:	Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	PROC8b, PROC9
CS9:	Industrial use (Roller application or brushing)	PROC10
CS10:	Industrial use (Treatment of articles by dipping and pouring)	PROC13
CS11:	Industrial use (Lubrication at high energy conditions in metal working operations, General greasing/lubrication at high kinetic energy conditions)	PROC17, PROC18

12.2. ES 12 Conditions of use affecting exposure

12.2.1 ES 12 - CS 1: Control of environmental exposure: Industrial use (Use of non-reactive processing aid at industrial site (no inclusion into or onto article), Use of functional fluid at industrial site) (ERC4, ERC7)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

12.2.2 ES 12 - CS 2: Control of worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

12.2.3 ES 12 - CS 3: Control of worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	Chemical production or refinery in closed continuous process

with occasional controlled exposure or processes with equivalent containment conditions
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

12.2.4 ES 12 - CS 4: Control of worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²
Remarks	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Remarks	:	Chemical production where opportunity for exposure arises

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Note	:	Chemical production where opportunity for exposure arises No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

12.2.5 ES 12 - CS 5: Control of worker exposure: Industrial use (Mixing or blending in batch processes) (PROC5)

Product characteristics

Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : Dermal
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

12.2.6 ES 12 - CS 6: Control of worker exposure: Industrial use (Industrial spraying) (PROC7)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Amount used
Amounts used : 0,6 L/min

Frequency and duration of use
Exposure duration : 360 min
Frequency of use : <= 5 days per week

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use
Room size : > 1000 m3

Risk Management Measures
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 50 %

Note	:	Ensure that the direction of airflow is clearly away from the worker.
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %
Personal protective measures	:	Wear suitable protective clothing. Wear suitable coveralls to prevent exposure to the skin.
Effectiveness (of a measure)	:	80 %
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the distance from worker to task is greater than 1 m.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that direction of application is only horizontal or downward.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of work area
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of equipment
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure regular inspection, cleaning and maintenance of equipment and machines.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

12.2.7 ES 12 - CS 7: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm^2

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	inhalative
Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	90 %
Personal protective measures	:	If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

12.2.8 ES 12 - CS 8: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

12.2.9 ES 12 - CS 9: Control of worker exposure: Industrial use (Roller application or brushing) (PROC10)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid

Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to : 960 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : Dermal
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

12.2.10 ES 12 - CS 10: Control of worker exposure: Industrial use (Treatment of articles by dipping and pouring) (PROC13)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : Dermal
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

12.2.11 ES 12 - CS 11: Control of worker exposure: Industrial use (Lubrication at high energy conditions in metal working operations, General greasing/lubrication at high kinetic energy conditions) (PROC17, PROC18)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm^2

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	inhalative
Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	90 %
Exposure routes	:	Dermal
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %
Note	:	Lubrication at high energy conditions in metal working operations

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

12.3. ES 12 Exposure estimation and reference to its source

12.3.2 ES 12 - CS 2: Worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR

Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,004

12.3.3 ES 12 - CS 3: Worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,08

12.3.4 ES 12 - CS 4: Worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	7,76 mg/m³ (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,003
combined routes	ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,06
combined routes	ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises	0,43

12.3.5 ES 12 - CS 5: Worker exposure: Industrial use (Mixing or blending in batch processes) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,38

12.3.6 ES 12 - CS 6: Worker exposure: Industrial use (Industrial spraying) (PROC7)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	9,79 mg/m³ (Stoffenmanager v4.0)	0,28
Worker - dermal, long-term - systemic	54,6 mg/kg bw/day (RISKOFDERM v2.1)	0,52
combined routes	Not applicable	0,80

12.3.7 ES 12 - CS 7: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,20

12.3.8 ES 12 - CS 8: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities	0,43
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated	0,37

	filling line, including weighing))	
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	0,43

12.3.9 ES 12 - CS 9: Worker exposure: Industrial use (Roller application or brushing) (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,87 mg/m³ (ECETOC TRA worker v2.0)	0,74
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA worker v2.0)	0,03
combined routes	ECETOC TRA worker v2.0	0,77

12.3.10 ES 12 - CS 10: Worker exposure: Industrial use (Treatment of articles by dipping and pouring) (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,87 mg/m³ (ECETOC TRA worker v2.0)	0,74
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,75

12.3.11 ES 12 - CS 11: Worker exposure: Industrial use (Lubrication at high energy conditions in metal working operations, General greasing/lubrication at high kinetic energy conditions) (PROC17, PROC18)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0, Lubrication at high energy conditions in metal working operations)	0,07
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA worker v2.0, Lubrication at high energy conditions in metal working operations)	0,03
combined routes	ECETOC TRA worker v2.0, Lubrication at high energy conditions in metal working operations	0,10
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0, General greasing/lubrication at high kinetic energy conditions)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0, General greasing/lubrication at high kinetic energy conditions)	0,13

combined routes	ECETOC TRA worker v2.0, General greasing/lubrication at high kinetic energy conditions	0,20

12.4. ES 12 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

13. ES 13: Industrial use; Metal working fluids

13.1. Title section

Environment		
CS1:	Industrial use (Use of non-reactive processing aid at industrial site (no inclusion into or onto article))	ERC4
Workers		
CS2:	Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	PROC1
CS3:	Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	PROC2
CS4:	Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises)	PROC3, PROC4
CS5:	Industrial use (Mixing or blending in batch processes)	PROC5
CS6:	Industrial use (Industrial spraying)	PROC7
CS7:	Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS8:	Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	PROC8b, PROC9
CS9:	Industrial use (Roller application or brushing)	PROC10
CS10:	Industrial use (Treatment of articles by dipping and pouring)	PROC13
CS11:	Industrial use (Lubrication at high energy conditions in metal working operations)	PROC17

13.2. ES 13 Conditions of use affecting exposure

13.2.1 ES 13 - CS 1: Control of environmental exposure: Industrial use (Use of non-reactive processing aid at industrial site (no inclusion into or onto article)) (ERC4)

Remarks : As no environmental hazard was identified no environmental-

related exposure assessment and risk characterization was performed.

13.2.2 ES 13 - CS 2: Control of worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

13.2.3 ES 13 - CS 3: Control of worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside

hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

13.2.4 ES 13 - CS 4: Control of worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Palm of one hand
Covers skin contact area up to : 240 cm²
Remarks : Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²
Remarks : Chemical production where opportunity for exposure arises

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Technical conditions and measures : Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Note : Chemical production where opportunity for exposure arises
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

13.2.5 ES 13 - CS 5: Control of worker exposure: Industrial use (Mixing or blending in batch processes) (PROC5)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm^2

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : Dermal
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

13.2.6 ES 13 - CS 6: Control of worker exposure: Industrial use (Industrial spraying) (PROC7)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Amount used
Amounts used : 0,6 L/min

Frequency and duration of use
Exposure duration : 360 min
Frequency of use : <= 5 days per week

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	> 1000 m3

Risk Management Measures

Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	50 %
Note	:	Ensure that the direction of airflow is clearly away from the worker.
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %
Personal protective measures	:	Wear suitable protective clothing. Wear suitable coveralls to prevent exposure to the skin.
Effectiveness (of a measure)	:	80 %
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the distance from worker to task is greater than 1 m.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that direction of application is only horizontal or downward.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of work area
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of equipment
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure regular inspection, cleaning and maintenance of equipment and machines.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

13.2.7 ES 13 - CS 7: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min

Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to : 960 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : inhalative
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 90 %
Personal protective measures : If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

13.2.8 ES 13 - CS 8: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

13.2.9 ES 13 - CS 9: Control of worker exposure: Industrial use (Roller application or

brushing) (PROC10)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	Dermal
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

13.2.10 ES 13 - CS 10: Control of worker exposure: Industrial use (Treatment of articles by dipping and pouring) (PROC13)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	Dermal
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

13.2.11 ES 13 - CS 11: Control of worker exposure: Industrial use (Lubrication at high energy conditions in metal working operations) (PROC17)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm^2

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	inhalative
Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	90 %
Exposure routes	:	Dermal
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

13.3. ES 13 Exposure estimation and reference to its source

13.3.2 ES 13 - CS 2: Worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,004

13.3.3 ES 13 - CS 3: Worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,08

13.3.4 ES 13 - CS 4: Worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	7,76 mg/m³ (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,003
combined routes	ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,06
combined routes	ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises	0,43

13.3.5 ES 13 - CS 5: Worker exposure: Industrial use (Mixing or blending in batch processes) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,38

13.3.6 ES 13 - CS 6: Worker exposure: Industrial use (Industrial spraying) (PROC7)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	9,79 mg/m³ (Stoffenmanager v4.0)	0,28
Worker - dermal, long-term - systemic	54,6 mg/kg bw/day (RISKOFDERM v2.1)	0,52
combined routes	Not applicable	0,80

13.3.7 ES 13 - CS 7: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,20

13.3.8 ES 13 - CS 8: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or	0,43

	mixture (charging/discharging) at dedicated facilities	
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	0,43

13.3.9 ES 13 - CS 9: Worker exposure: Industrial use (Roller application or brushing) (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,87 mg/m³ (ECETOC TRA worker v2.0)	0,74
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA worker v2.0)	0,03
combined routes	ECETOC TRA worker v2.0	0,77

13.3.10 ES 13 - CS 10: Worker exposure: Industrial use (Treatment of articles by dipping and pouring) (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,87 mg/m³ (ECETOC TRA worker v2.0)	0,74
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,75

13.3.11 ES 13 - CS 11: Worker exposure: Industrial use (Lubrication at high energy conditions in metal working operations) (PROC17)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0, Lubrication at high energy conditions in metal working operations)	0,07
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA worker v2.0, Lubrication at high energy conditions in metal working operations)	0,03
combined routes	ECETOC TRA worker v2.0, Lubrication at high energy conditions in metal working operations	0,10

13.4. ES 13 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

14. ES 14: Professional use; Metal working fluids

14.1. Title section

Environment		
CS1:	Professional use (Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor), Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor))	ERC8a, ERC8d
Workers		
CS2:	Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	PROC1, PROC2, PROC3
CS3:	Professional use (Mixing or blending in batch processes)	PROC5
CS4:	Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS5:	Professional use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	PROC8b, PROC9
CS6:	Professional use (Roller application or brushing)	PROC10
CS7:	Professional use (Non-industrial spraying)	PROC11
CS8:	Professional use (Treatment of articles by dipping and pouring)	PROC13
CS9:	Professional use (Lubrication at high energy conditions in metal working operations)	PROC17

14.2. ES 14 Conditions of use affecting exposure

14.2.1 ES 14 - CS 1: Control of environmental exposure: Professional use (Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor), Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)) (ERC8a, ERC8d)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

14.2.2 ES 14 - CS 2: Control of worker exposure: Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition) (PROC1, PROC2, PROC3)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²
Remarks	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Remarks	:	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions Sample via a closed loop or other system to avoid exposure.
Technical conditions and measures	:	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
Technical conditions and measures	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition With occasional controlled exposure

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

14.2.3 ES 14 - CS 3: Control of worker exposure: Professional use (Mixing or blending in batch processes) (PROC5)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

14.2.4 ES 14 - CS 4: Control of worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to : 960 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures

Exposure routes	:	inhalative
Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	80 %
Personal protective measures	:	If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure)	:	80 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

14.2.5 ES 14 - CS 5: Control of worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

14.2.6 ES 14 - CS 6: Control of worker exposure: Professional use (Roller application or brushing) (PROC10)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	inhalative
Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	80 %
Personal protective measures	:	If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure)	:	80 %
Exposure routes	:	Dermal
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

14.2.7 ES 14 - CS 7: Control of worker exposure: Professional use (Non-industrial spraying) (PROC11)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Amount used

Amounts used	:	0,05 L/min

Frequency and duration of use

Exposure duration	:	150 min
Frequency of use	:	<= 5 days per week

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	<= 1000 m3

Risk Management Measures

Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

Effectiveness (of a measure)	:	90 %
Personal protective measures	:	Wear suitable protective clothing. Wear suitable coveralls to prevent exposure to the skin.
Effectiveness (of a measure)	:	80 %
Personal protective measures	:	Wear a respirator conforming to EN140.
Effectiveness (of a measure)	:	40 %
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that direction of application is only horizontal or downward.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the distance from worker to task is greater than 1 m.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the direction of airflow is clearly away from the worker.
Note	:	Not applicable
Organisational measures to prevent /limit releases, dispersion and exposure	:	Provide enhanced general ventilation by mechanical means.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of work area
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of equipment
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure regular inspection, cleaning and maintenance of equipment and machines.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the task is not carried out by more than one worker simultaneously.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

14.2.8 ES 14 - CS 8: Control of worker exposure: Professional use (Treatment of articles by dipping and pouring) (PROC13)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid

Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

14.2.9 ES 14 - CS 9: Control of worker exposure: Professional use (Lubrication at high energy conditions in metal working operations) (PROC17)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to : 960 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : inhalative
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 90 %

Exposure routes : Dermal
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

14.3. ES 14 Exposure estimation and reference to its source

14.3.2 ES 14 - CS 2: Worker exposure: Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition) (PROC1, PROC2, PROC3)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	0,003
combined routes	ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	0,004
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	0,01
combined routes	ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	0,38
Worker - inhalative, long-term - local and systemic	7,76 mg/m³ (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled	0,003

	exposure or processes with equivalent containment condition)	
combined routes	ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	0,23

14.3.3 ES 14 - CS 3: Worker exposure: Professional use (Mixing or blending in batch processes) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0, Mixing or blending in batch processes)	0,74
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0, Mixing or blending in batch processes)	0,01
combined routes	ECETOC TRA worker v2.0, Mixing or blending in batch processes	0,75

14.3.4 ES 14 - CS 4: Worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,50

14.3.5 ES 14 - CS 5: Worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities	0,80
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,74

Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	0,80

14.3.6 ES 14 - CS 6: Worker exposure: Professional use (Roller application or brushing) (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA worker v2.0)	0,03
combined routes	ECETOC TRA worker v2.0	0,40

14.3.7 ES 14 - CS 7: Worker exposure: Professional use (Non-industrial spraying) (PROC11)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	14,05 mg/m³ (Stoffenmanager v4.0)	0,40
Worker - dermal, long-term - systemic	53,75 mg/kg bw/day (RISKOFDERM v2.1)	0,51
combined routes	Not applicable	0,91

14.3.8 ES 14 - CS 8: Worker exposure: Professional use (Treatment of articles by dipping and pouring) (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0)	0,74
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,75

14.3.9 ES 14 - CS 9: Worker exposure: Professional use (Lubrication at high energy conditions in metal working operations) (PROC17)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37

- local and systemic		
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA worker v2.0)	0,03
combined routes	ECETOC TRA worker v2.0	0,40

14.4. ES 14 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

15. ES 15: Professional use; Use in agrochemicals

15.1. Title section

Environment		
CS1:	Professional use (Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor), Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor))	ERC8a, ERC8d
Workers		
CS2:	Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	PROC1, PROC2
CS3:	Professional use (Chemical production where opportunity for exposure arises)	PROC4
CS4:	Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS5:	Professional use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	PROC8b, PROC9
CS6:	Professional use (Non-industrial spraying)	PROC11
CS7:	Professional use (Treatment of articles by dipping and pouring)	PROC13

15.2. ES 15 Conditions of use affecting exposure

15.2.1 ES 15 - CS 1: Control of environmental exposure: Professional use (Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor), Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)) (ERC8a, ERC8d)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was

performed.

15.2.2 ES 15 - CS 2: Control of worker exposure: Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC1, PROC2)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²
Remarks	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Remarks	:	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions Sample via a closed loop or other system to avoid exposure.
Technical conditions and measures	:	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

15.2.3 ES 15 - CS 3: Control of worker exposure: Professional use (Chemical production where opportunity for exposure arises) (PROC4)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

15.2.4 ES 15 - CS 4: Control of worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	inhalative
Technical conditions and	:	Local exhaust ventilation

measures
Effectiveness (of a measure) : 80 %
Personal protective measures : If technical measures not practical:
Wear suitable respiratory protection.
Effectiveness (of a measure) : 80 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

15.2.5 ES 15 - CS 5: Control of worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

15.2.6 ES 15 - CS 6: Control of worker exposure: Professional use (Non-industrial spraying) (PROC11)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Amount used
Amounts used : 0,05 L/min

Frequency and duration of use

Exposure duration	:	150 min
Frequency of use	:	<= 5 days per week

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	<= 1000 m3

Risk Management Measures

Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %
Personal protective measures	:	Wear suitable protective clothing. Wear suitable coveralls to prevent exposure to the skin.
Effectiveness (of a measure)	:	80 %
Personal protective measures	:	Wear a respirator conforming to EN140.
Effectiveness (of a measure)	:	40 %
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that direction of application is only horizontal or downward.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the distance from worker to task is greater than 1 m.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the direction of airflow is clearly away from the worker.
Note	:	Not applicable
Organisational measures to prevent /limit releases, dispersion and exposure	:	Provide enhanced general ventilation by mechanical means.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of work area
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of equipment
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure regular inspection, cleaning and maintenance of equipment and machines.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the task is not carried out by more than one worker simultaneously.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

15.2.7 ES 15 - CS 7: Control of worker exposure: Professional use (Treatment of articles by dipping and pouring) (PROC13)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm^2

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

15.3. ES 15 Exposure estimation and reference to its source

15.3.2 ES 15 - CS 2: Worker exposure: Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC1, PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m^3 (ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	0,0007

Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	0,003
combined routes	ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	0,004
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	0,01
combined routes	ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	0,38

15.3.3 ES 15 - CS 3: Worker exposure: Professional use (Chemical production where opportunity for exposure arises) (PROC4)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0)	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0)	0,06
combined routes	ECETOC TRA worker v2.0	0,80

15.3.4 ES 15 - CS 4: Worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,50

15.3.5 ES 15 - CS 5: Worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Route of exposure and type	Exposure estimate	RCR

of effects		
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities	0,80
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	0,80

15.3.6 ES 15 - CS 6: Worker exposure: Professional use (Non-industrial spraying) (PROC11)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	14,05 mg/m³ (Stoffenmanager v4.0)	0,40
Worker - dermal, long-term - systemic	53,75 mg/kg bw/day (RISKOFDERM v2.1)	0,51
combined routes	Not applicable	0,91

15.3.7 ES 15 - CS 7: Worker exposure: Professional use (Treatment of articles by dipping and pouring) (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0)	0,74
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,75

15.4. ES 15 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

16. ES 16: Industrial use; Use in functional fluids

16.1. Title section

Environment		
CS1:	Industrial use (Use of functional fluid at industrial site)	ERC7
Workers		
CS2:	Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	PROC1
CS3:	Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	PROC2
CS4:	Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises)	PROC3, PROC4
CS5:	Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS6:	Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	PROC8b, PROC9

16.2. ES 16 Conditions of use affecting exposure

16.2.1 ES 16 - CS 1: Control of environmental exposure: Industrial use (Use of functional fluid at industrial site) (ERC7)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

16.2.2 ES 16 - CS 2: Control of worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Product characteristics

Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use

Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

16.2.3 ES 16 - CS 3: Control of worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

16.2.4 ES 16 - CS 4: Control of worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical

production where opportunity for exposure arises) (PROC3, PROC4)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²
Remarks	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Remarks	:	Chemical production where opportunity for exposure arises

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Note	:	Chemical production where opportunity for exposure arises No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

16.2.5 ES 16 - CS 5: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	inhalative
Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	90 %
Personal protective measures	:	If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

16.2.6 ES 16 - CS 6: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year
Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use
Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	No specific measures identified.

Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

16.3. ES 16 Exposure estimation and reference to its source

16.3.2 ES 16 - CS 2: Worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,004

16.3.3 ES 16 - CS 3: Worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,08

16.3.4 ES 16 - CS 4: Worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	7,76 mg/m³ (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,22
Worker - dermal, long-term -	0,34 mg/kg bw/day (ECETOC TRA worker v2.0,	0,003

systemic	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	
combined routes	ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,06
combined routes	ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises	0,43

16.3.5 ES 16 - CS 5: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,20

16.3.6 ES 16 - CS 6: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,37
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,06
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities	0,43
combined routes	ECETOC TRA worker v2.0, Transfer of substance or	0,43

	mixture (charging/discharging) at dedicated facilities	
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,37
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,06
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	0,43
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	0,43

16.4. ES 16 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

17. ES 17: Professional use; Use in functional fluids

17.1. Title section

Environment		
CS1:	Professional use (Widespread use of functional fluid (indoor), Widespread use of functional fluid (outdoor))	ERC9a, ERC9b
Workers		
CS2:	Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	PROC1, PROC2, PROC3
CS3:	Professional use (Chemical production where opportunity for exposure arises)	PROC4
CS4:	Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS5:	Professional use (Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	PROC9

CS6: Professional use (Use of functional fluids in small devices)	PROC20

17.2. ES 17 Conditions of use affecting exposure

17.2.1 ES 17 - CS 1: Control of environmental exposure: Professional use (Widespread use of functional fluid (indoor), Widespread use of functional fluid (outdoor)) (ERC9a, ERC9b)

Remarks	:	As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

17.2.2 ES 17 - CS 2: Control of worker exposure: Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition) (PROC1, PROC2, PROC3)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²
Remarks	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Remarks	:	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions Sample via a closed loop or other system to avoid exposure.
Technical conditions and measures	:	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
Technical conditions and measures	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition With occasional controlled exposure

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

17.2.3 ES 17 - CS 3: Control of worker exposure: Professional use (Chemical production where opportunity for exposure arises) (PROC4)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

17.2.4 ES 17 - CS 4: Control of worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics

Concentration of the Substance in	:	<= 100 %

Mixture/Article

Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	inhalative
Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	80 %
Personal protective measures	:	If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure)	:	80 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

17.2.5 ES 17 - CS 5: Control of worker exposure: Professional use (Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC9)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

17.2.6 ES 17 - CS 6: Control of worker exposure: Professional use (Use of functional fluids in small devices) (PROC20)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

17.3. ES 17 Exposure estimation and reference to its source

17.3.2 ES 17 - CS 2: Worker exposure: Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition) (PROC1, PROC2, PROC3)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood	0,0007

	of exposure or processes with equivalent containment conditions)	
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	0,003
combined routes	ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	0,004
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	0,01
combined routes	ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	0,38
Worker - inhalative, long-term - local and systemic	7,76 mg/m³ (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,003
combined routes	ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	0,23

17.3.3 ES 17 - CS 3: Worker exposure: Professional use (Chemical production where opportunity for exposure arises) (PROC4)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0)	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0)	0,06
combined routes	ECETOC TRA worker v2.0	0,80

17.3.4 ES 17 - CS 4: Worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type	Exposure estimate	RCR

of effects		
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,50

17.3.5 ES 17 - CS 5: Worker exposure: Professional use (Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC9)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	0,80

17.3.6 ES 17 - CS 6: Worker exposure: Professional use (Use of functional fluids in small devices) (PROC20)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	1,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,02
combined routes	ECETOC TRA worker v2.0	0,39

17.4. ES 17 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

18. ES 18: Consumer use; Heat transfer fluids, Hydraulic fluids

18.1. Title section

Heat transfer fluids (PC16)		
Hydraulic fluids (PC17)		
Environment		
CS1:	Consumer use (Widespread use of functional fluid (indoor), Widespread use of functional fluid (outdoor))	ERC9a, ERC9b
Consumer		
CS2:	Consumer use (Heat transfer fluids, Hydraulic fluids)	PC16, PC17

18.2. ES 18 Conditions of use affecting exposure

18.2.1 ES 18 - CS 1: Control of environmental exposure: Consumer use (Widespread use of functional fluid (indoor), Widespread use of functional fluid (outdoor)) (ERC9a, ERC9b)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

18.2.2 ES 18 - CS 2: Control of consumer exposure: Consumer use (Heat transfer fluids, Hydraulic fluids) (PC16, PC17)

Remarks : Transfer of substance or mixture (charging/discharging) at non dedicated-facilities

Product characteristics

Concentration of the Substance in Mixture/Article : <= 30 %

Physical Form (at time of use) : Liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use

Exposure duration : < 15 min

Human factors not influenced by risk management

Dermal exposure : Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to : 960 cm^2

Other given operational conditions affecting consumers exposure

Outdoor / Indoor : Indoor use
Temperature : 25 °C

Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)

Consumer Measures : No specific measures identified.

18.3. ES 18 Exposure estimation and reference to its source

18.3.2 ES 18 - CS 2: Consumer exposure: Consumer use (Heat transfer fluids, Hydraulic fluids) (PC16, PC17)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	1,93 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	0,28
Worker - dermal, long-term - systemic	4,11 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	0,08
Oral	Not applicable	
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at non dedicated-facilities	0,36

18.4. ES 18 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

19. ES 19: Professional use; Anti-freeze and de-icing products

19.1. Title section

Environment		
CS1:	Professional use (Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor))	ERC8d
Workers		
CS2:	Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	PROC1, PROC2
CS3:	Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS4:	Professional use (Transfer of substance or mixture (charging/discharging) at dedicated facilities)	PROC8b
CS5:	Professional use (Non-industrial spraying)	PROC11

19.2. ES 19 Conditions of use affecting exposure

19.2.1 ES 19 - CS 1: Control of environmental exposure: Professional use (Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)) (ERC8d)

Remarks	:	As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

19.2.2 ES 19 - CS 2: Control of worker exposure: Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC1, PROC2)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²
Remarks	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Remarks	:	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent

containment conditions
Sample via a closed loop or other system to avoid exposure.

Technical conditions and measures : Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

19.2.3 ES 19 - CS 3: Control of worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to : 960 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : inhalative
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 80 %
Personal protective measures : If technical measures not practical:
Wear suitable respiratory protection.
Effectiveness (of a measure) : 80 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

19.2.4 ES 19 - CS 4: Control of worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at dedicated facilities) (PROC8b)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm^2

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

19.2.5 ES 19 - CS 5: Control of worker exposure: Professional use (Non-industrial spraying) (PROC11)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Amount used
Amounts used : 0,05 L/min

Frequency and duration of use
Exposure duration : 150 min
Frequency of use : <= 5 days per week

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use
Room size : <= 1000 m3

Risk Management Measures
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure) : 90 %

Personal protective measures : Wear suitable protective clothing.
Wear suitable coveralls to prevent exposure to the skin.
Effectiveness (of a measure) : 80 %

Personal protective measures : Wear a respirator conforming to EN140.
Effectiveness (of a measure) : 40 %

Organisational measures to : Ensure that direction of application is only horizontal or

prevent /limit releases, dispersion and exposure		downward.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the distance from worker to task is greater than 1 m.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the direction of airflow is clearly away from the worker.
Note	:	Not applicable
Organisational measures to prevent /limit releases, dispersion and exposure	:	Provide enhanced general ventilation by mechanical means.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of work area
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of equipment
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure regular inspection, cleaning and maintenance of equipment and machines.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the task is not carried out by more than one worker simultaneously.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

19.3. ES 19 Exposure estimation and reference to its source

19.3.2 ES 19 - CS 2: Worker exposure: Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC1, PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment	0,0007

	conditions)	
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	0,003
combined routes	ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	0,004
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	0,01
combined routes	ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	0,38

19.3.3 ES 19 - CS 3: Worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,50

19.3.4 ES 19 - CS 4: Worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at dedicated facilities) (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities	0,80

19.3.5 ES 19 - CS 5: Worker exposure: Professional use (Non-industrial spraying) (PROC11)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	14,05 mg/m³ (Stoffenmanager v4.0)	0,40
Worker - dermal, long-term - systemic	53,75 mg/kg bw/day (RISKOFDERM v2.1)	0,51
combined routes	Not applicable	0,91

19.4. ES 19 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

20. ES 20: Consumer use; Anti-freeze and de-icing products

20.1. Title section

Anti-freeze and de-icing products (PC4)	
Environment	
CS1: Consumer use (Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor))	ERC8d
Consumer	
CS2: Consumer use (Anti-freeze and de-icing products)	PC4
CS3: Consumer use (Anti-freeze and de-icing products)	PC4
CS4: Consumer use (Anti-freeze and de-icing products)	PC4

20.2. ES 20 Conditions of use affecting exposure

20.2.1 ES 20 - CS 1: Control of environmental exposure: Consumer use (Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)) (ERC8d)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

20.2.2 ES 20 - CS 2: Control of consumer exposure: Consumer use (Anti-freeze and de-icing products) (PC4)

Remarks : De-icing of vehicles and similar equipment by spraying

Spraying

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Liquid
Vapour pressure	:	0,123 hPa

Amount used

Amounts used	:	0,0468 kg/min

Frequency and duration of use

Spray duration	:	0,7 min
Frequency of use	:	365 days per year
Exposure duration	:	240 min

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands and forearms.
Covers skin contact area up to	:	1900 cm²
Dermal	:	0,000046 kg/min
Uptake fraction, Oral	:	100 %

Other given operational conditions affecting consumers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	58 m3
Temperature	:	25 °C
Ventilation rate per hour	:	0,5
Room height	:	2,5 m
Weight percent	:	100 %
Remarks	:	Non-Volatile
Density	:	1,8 g/cm3
Remarks	:	Non-Volatile
Airborne fraction	:	100 %
Remarks	:	Non-Volatile
Inhalation cut-off diameter	:	0,015 mm

Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)

Consumer Measures	:	Ensure spraying away from persons.

20.2.3 ES 20 - CS 3: Control of consumer exposure: Consumer use (Anti-freeze and de-icing products) (PC4)

Remarks	:	De-icing of vehicles and similar equipment by spraying Cleaning

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %

Physical Form (at time of use) : Liquid
Vapour pressure : 0,123 hPa

Amount used
Amounts used : 0,00029 kg/day

Frequency and duration of use
Frequency of use : 365 days per year

Human factors not influenced by risk management
Dermal exposure : Palm of one hand
Covers skin contact area up to : 215 cm²

Other given operational conditions affecting consumers exposure
Temperature : 25 °C

20.2.4 ES 20 - CS 4: Control of consumer exposure: Consumer use (Anti-freeze and de-icing products) (PC4)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 30 %

Physical Form (at time of use) : Liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : < 15 min

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to : 960 cm²

Other given operational conditions affecting consumers exposure
Outdoor / Indoor : Indoor use
Temperature : 25 °C

Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)
Consumer Measures : No specific measures identified.

20.3. ES 20 Exposure estimation and reference to its source

20.3.2 ES 20 - CS 2: Consumer exposure: Consumer use (Anti-freeze and de-icing products) (PC4)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	0,0006 mg/m³ (Consexpo V4.1)	0,0001
Chronic dermal systemic exposure	0,50 mg/kg bw/day (Consexpo V4.1)	0,009
Consumer - oral, long-term - systemic	0,005 mg/kg bw/day (Consexpo V4.1)	
combined routes	Consexpo V4.1	0,009

20.3.3 ES 20 - CS 3: Consumer exposure: Consumer use (Anti-freeze and de-icing products) (PC4)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	Not applicable	
Chronic dermal systemic exposure	4,46 mg/kg bw/day (Consexpo V4.1)	0,08
Consumer - oral, long-term - systemic	Not applicable	
combined routes	Consexpo V4.1	0,08

20.3.4 ES 20 - CS 4: Consumer exposure: Consumer use (Anti-freeze and de-icing products) (PC4)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	1,93 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	0,28
Worker - dermal, long-term - systemic	4,11 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	0,08
Oral	Not applicable	
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at non dedicated-facilities	0,36

20.4. ES 20 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

21. ES 21: Industrial use, Professional use; Use in

laboratories

21.1. Title section

Environment		
CS1:	Industrial use, Professional use (Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor))	ERC8a
Workers		
CS2:	Industrial use, Professional use (Use as laboratory reagent)	PROC15

21.2. ES 21 Conditions of use affecting exposure

21.2.1 ES 21 - CS 1: Control of environmental exposure: Industrial use, Professional use (Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)) (ERC8a)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

21.2.2 ES 21 - CS 2: Control of worker exposure: Industrial use, Professional use (Use as laboratory reagent) (PROC15)

Product characteristics

Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use

Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management

Dermal exposure : Palm of one hand
Covers skin contact area up to : 240 cm^2

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor use

Risk Management Measures

Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

21.3. ES 21 Exposure estimation and reference to its source

21.3.2 ES 21 - CS 2: Worker exposure: Industrial use, Professional use (Use as laboratory reagent) (PROC15)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,004

21.4. ES 21 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

22. ES 22: Industrial use; Use in water treatment agents

22.1. Title section

Environment		
CS1:	Industrial use (Formulation into solid matrix, Use of non-reactive processing aid at industrial site (no inclusion into or onto article))	ERC3, ERC4
Workers		
CS2:	Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	PROC1
CS3:	Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	PROC2
CS4:	Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises)	PROC3, PROC4
CS5:	Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS6:	Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities)	PROC8b
CS7:	Industrial use (Treatment of articles by dipping and pouring)	PROC13

22.2. ES 22 Conditions of use affecting exposure

22.2.1 ES 22 - CS 1: Control of environmental exposure: Industrial use (Formulation into solid matrix, Use of non-reactive processing aid at industrial site (no inclusion into or onto article)) (ERC3, ERC4)

Remarks	:	As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

22.2.2 ES 22 - CS 2: Control of worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

22.2.3 ES 22 - CS 3: Control of worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Product characteristics

Concentration of the Substance in	:	<= 100 %

Mixture/Article

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

22.2.4 ES 22 - CS 4: Control of worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Palm of one hand
Covers skin contact area up to : 240 cm²
Remarks : Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²
Remarks : Chemical production where opportunity for exposure arises

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Note	:	Chemical production where opportunity for exposure arises No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

22.2.5 ES 22 - CS 5: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm^2

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	inhalative
Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	90 %
Personal protective measures	:	If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

22.2.6 ES 22 - CS 6: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities) (PROC8b)

Product characteristics

Concentration of the Substance in	:	<= 100 %

Mixture/Article

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : Transfer of substance or mixture (charging/discharging) at dedicated facilities
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

22.2.7 ES 22 - CS 7: Control of worker exposure: Industrial use (Treatment of articles by dipping and pouring) (PROC13)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : Dermal
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

22.3. ES 22 Exposure estimation and reference to its source

22.3.2 ES 22 - CS 2: Worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,004

22.3.3 ES 22 - CS 3: Worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,08

22.3.4 ES 22 - CS 4: Worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	7,76 mg/m³ (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled	0,003

	exposure or processes with equivalent containment condition)	
combined routes	ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,06
combined routes	ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises	0,43

22.3.5 ES 22 - CS 5: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,20

22.3.6 ES 22 - CS 6: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities) (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0)	0,06
combined routes	ECETOC TRA worker v2.0	0,43

22.3.7 ES 22 - CS 7: Worker exposure: Industrial use (Treatment of articles by dipping and pouring) (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,87 mg/m³ (ECETOC TRA worker v2.0)	0,74
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,75

22.4. ES 22 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

23. ES 23: Consumer use; Adhesives, sealants

23.1. Title section

Adhesives, sealants (PC1)		
Environment		
CS1:	Consumer use (Widespread use leading to inclusion into/onto article (indoor), Widespread use leading to inclusion into/onto article (outdoor))	ERC8c, ERC8f
Consumer		
CS2:	Consumer use (Adhesives, sealants)	PC1

23.2. ES 23 Conditions of use affecting exposure

23.2.1 ES 23 - CS 1: Control of environmental exposure: Consumer use (Widespread use leading to inclusion into/onto article (indoor), Widespread use leading to inclusion into/onto article (outdoor)) (ERC8c, ERC8f)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

23.2.2 ES 23 - CS 2: Control of consumer exposure: Consumer use (Adhesives, sealants) (PC1)

Remarks : Worst case assumption
Mixing operations (open systems)
Loading of application equipment

Product characteristics

Concentration of the Substance in Mixture/Article : <= 0,075 %

Molecular weight : 3.000 g/mol
Physical Form (at time of use) : Liquid
Vapour pressure : 0,123 hPa

Amount used

Amounts used : 9 kg/day

Frequency and duration of use

Application duration	:	75 min
Frequency of use	:	0,25 days per year
Exposure duration	:	75 min

Human factors not influenced by risk management

Covers skin contact area up to	:	110 cm²
Dermal	:	0,00003 kg/min

Other given operational conditions affecting consumers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	58 m3
Temperature	:	25 °C
Ventilation rate per hour	:	0,5
Mass transfer rate	:	4740 m/min
Release area	:	4 m2

Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)

Consumer Measures	:	No specific measures identified.

23.3. ES 23 Exposure estimation and reference to its source

23.3.2 ES 23 - CS 2: Consumer exposure: Consumer use (Adhesives, sealants) (PC1)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	4,1 mg/m³ (Consexpo V4.1)	0,59
Chronic dermal systemic exposure	0,26 mg/kg bw/day (Consexpo V4.1)	0,005
Consumer - oral, long-term - systemic	Not applicable	
combined routes	Consexpo V4.1	0,60

23.4. ES 23 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

24. ES 24: Industrial use; Manufacture of substance,

Adhesives, sealants, Foaming, Use in coatings, Use in polymer production

24.1. Title section

Environment		
CS1:	Industrial use (Formulation into mixture, Formulation into solid matrix, Use at industrial site leading to inclusion into/onto article, Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article))	ERC2, ERC3, ERC5, ERC6c
Workers		
CS2:	Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	PROC1
CS3:	Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	PROC2
CS4:	Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises)	PROC3, PROC4
CS5:	Industrial use (Mixing or blending in batch processes)	PROC5
CS6:	Industrial use (Industrial spraying)	PROC7
CS7:	Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS8:	Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	PROC8b, PROC9
CS9:	Industrial use (Roller application or brushing)	PROC10
CS10:	Industrial use (Treatment of articles by dipping and pouring)	PROC13
CS11:	Industrial use (Tabletting, compression, extrusion, pelettisation, granulation)	PROC14
CS12:	Industrial use (Use as laboratory reagent)	PROC15

24.2. ES 24 Conditions of use affecting exposure

24.2.1 ES 24 - CS 1: Control of environmental exposure: Industrial use (Formulation into mixture, Formulation into solid matrix, Use at industrial site leading to inclusion into/onto article, Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article)) (ERC2, ERC3, ERC5, ERC6c)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

24.2.2 ES 24 - CS 2: Control of worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with

equivalent containment conditions) (PROC1)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

24.2.3 ES 24 - CS 3: Control of worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

24.2.4 ES 24 - CS 4: Control of worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²
Remarks	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Remarks	:	Chemical production where opportunity for exposure arises

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Note	:	Chemical production where opportunity for exposure arises No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

24.2.5 ES 24 - CS 5: Control of worker exposure: Industrial use (Mixing or blending in batch processes) (PROC5)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	Dermal
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

24.2.6 ES 24 - CS 6: Control of worker exposure: Industrial use (Industrial spraying) (PROC7)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Amount used

Amounts used	:	0,6 L/min

Frequency and duration of use

Exposure duration	:	360 min
Frequency of use	:	<= 5 days per week

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	> 1000 m3

Risk Management Measures

Technical conditions and	:	Local exhaust ventilation

measures

Effectiveness (of a measure)	:	50 %
Note	:	Ensure that the direction of airflow is clearly away from the worker.
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %
Personal protective measures	:	Wear suitable protective clothing. Wear suitable coveralls to prevent exposure to the skin.
Effectiveness (of a measure)	:	80 %
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the distance from worker to task is greater than 1 m.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that direction of application is only horizontal or downward.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of work area
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of equipment
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure regular inspection, cleaning and maintenance of equipment and machines.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

24.2.7 ES 24 - CS 7: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm^2

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	inhalative
Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	90 %
Personal protective measures	:	If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

24.2.8 ES 24 - CS 8: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

24.2.9 ES 24 - CS 9: Control of worker exposure: Industrial use (Roller application or brushing) (PROC10)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to : 960 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : Dermal
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

24.2.10 ES 24 - CS 10: Control of worker exposure: Industrial use (Treatment of articles by dipping and pouring) (PROC13)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : Dermal
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

24.2.11 ES 24 - CS 11: Control of worker exposure: Industrial use (Tabletting, compression, extrusion, pelettisation, granulation) (PROC14)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

24.2.12 ES 24 - CS 12: Control of worker exposure: Industrial use (Use as laboratory reagent) (PROC15)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Amount used
Storage : < 1 kg, < 1 l

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 240 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : Use as laboratory reagent
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

24.3. ES 24 Exposure estimation and reference to its source

24.3.2 ES 24 - CS 2: Worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,004

24.3.3 ES 24 - CS 3: Worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,08

24.3.4 ES 24 - CS 4: Worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Route of exposure and type of effects	Exposure estimate	RCR

Worker - inhalative, long-term - local and systemic	7,76 mg/m³ (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,003
combined routes	ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,06
combined routes	ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises	0,43

24.3.5 ES 24 - CS 5: Worker exposure: Industrial use (Mixing or blending in batch processes) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,38

24.3.6 ES 24 - CS 6: Worker exposure: Industrial use (Industrial spraying) (PROC7)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	9,79 mg/m³ (Stoffenmanager v4.0)	0,28
Worker - dermal, long-term - systemic	54,6 mg/kg bw/day (RISKOFDERM v2.1)	0,52
combined routes	Not applicable	0,80

24.3.7 ES 24 - CS 7: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07

- local and systemic		
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,20

24.3.8 ES 24 - CS 8: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities	0,43
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	0,43

24.3.9 ES 24 - CS 9: Worker exposure: Industrial use (Roller application or brushing) (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,87 mg/m³ (ECETOC TRA worker v2.0)	0,74
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA worker v2.0)	0,03
combined routes	ECETOC TRA worker v2.0	0,77

24.3.10 ES 24 - CS 10: Worker exposure: Industrial use (Treatment of articles by dipping and pouring) (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term	25,87 mg/m³ (ECETOC TRA worker v2.0)	0,74

- local and systemic		
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,75

24.3.11 ES 24 - CS 11: Worker exposure: Industrial use (Tabletting, compression, extrusion, pelettisation, granulation) (PROC14)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	3,43 mg/kg bw/day (ECETOC TRA worker v2.0)	0,03
combined routes	ECETOC TRA worker v2.0	0,40

24.3.12 ES 24 - CS 12: Worker exposure: Industrial use (Use as laboratory reagent) (PROC15)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,37

24.4. ES 24 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

25. ES 25: Consumer use; Insulation foams

25.1. Title section

Polymer preparations and compounds (PC32)	
Environment	
CS1: Consumer use (Widespread use leading to inclusion into/onto article (indoor), Widespread use leading to inclusion into/onto article (outdoor))	ERC8c, ERC8f
Consumer	
CS2: Consumer use (Polymer preparations and compounds)	PC32

25.2. ES 25 Conditions of use affecting exposure

25.2.1 ES 25 - CS 1: Control of environmental exposure: Consumer use (Widespread use leading to inclusion into/onto article (indoor), Widespread use leading to inclusion into/onto article (outdoor)) (ERC8c, ERC8f)

Remarks	:	As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

25.2.2 ES 25 - CS 2: Control of consumer exposure: Consumer use (Polymer preparations and compounds) (PC32)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 5 %
Physical Form (at time of use)	:	Liquid
Vapour pressure	:	0,123 hPa

Amount used

Amount per use	:	0,825 kg

Frequency and duration of use

Exposure duration	:	30 min
Frequency of use	:	0,2 days per year

Human factors not influenced by risk management

Covers skin contact area up to	:	1900 cm^2
Breathing volume	:	1,5 m3/day

Other given operational conditions affecting consumers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	57,5 m3
Temperature	:	25 °C

Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)

Consumer Measures	:	No specific measures identified.

25.3. ES 25 Exposure estimation and reference to its source

25.3.2 ES 25 - CS 2: Consumer exposure: Consumer use (Polymer preparations and compounds) (PC32)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	0,06 mg/m³ (Consexpo V4.1)	0,009
Chronic dermal systemic exposure	0,007 mg/kg bw/day (Consexpo V4.1)	0,0008
Consumer - oral, long-term - systemic	Not applicable	
combined routes	Consexpo V4.1	0,01

25.4. ES 25 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2